COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXX OCTOBER 1951

BAKSHI (B. K.). **Studies on four species of Ceratocystis, with a discussion on fungi causing sap-stain in Britain.**—*Mycol. Pap., Commonw. mycol. Inst.*, 35, 16 pp., 3 pl., 4 figs., 1951. 3*s.* 9*d.*

Details are given of the life-histories in culture on agar and on wood of *Ceratocystis coerulescens* [*R.A.M.*, 29, p. 509], *C. longirostellata* n.sp. isolated from felled, black-stained oak (*Quercus* sp.), *C. galeiformis* n.sp. from the bark of Japanese larch (*Larix kaempferi*) infested with *Hylurgops palliatus* and *Dryocoetes autographus* [ibid., 30, p. 289] in Perthshire, Scotland, and *C. wilsoni* n.sp. also isolated from felled oak but not associated with staining.

The mycelium of *C. longirostellata* on malt agar is slow-growing, at first hyaline, later turning blackish-grey with a greenish tinge. The hyphae are thin-walled, hyaline, and 1·9 to 3 μ broad when young, brown and thick-walled when older. The conidiophores are 40 to 66 μ long, 2·5 μ broad at the base and 2 μ at the top. The unicellular, thin-walled, hyaline conidia, formed in groups on denticulations, measure 4·7 to 15·7 by 1·3 to 2·5 (average 8·3 by 2) μ and bear similar secondary and tertiary conidia. Perithecia develop abundantly, the bulb being transparent, light brown, and pseudoparenchymatous when young, becoming black and hirsute at maturity. The ventral diameter is 135·8 to 210 (178) μ and height 123·2 to 203 (165·2) μ; the neck is hyaline to light brown when young, becoming black when mature and 1,405 to 2,921 (2,126) μ long, 21 to 30·8 (25·6) μ broad at the base, and 11·2 to 15·4 (13·1) μ at the top; frequently there are two necks. The ostiole with 34 to 56 cilia is 63 μ long and 2·3 to 2·7 μ broad at the base, tapering to a point at the tip. The hyaline, unicellular, thin-walled, kidney-shaped ascospores measure 4·3 to 5·2 by 1·3 to 1·7 (average 4·7 by 1·5) μ.

Colonies of *C. galeiformis* are appressed and green, brown, or black. The young hyphae are thin-walled, hyaline, and 1·3 to 2·1 μ broad, becoming thick-walled, brown or brownish-green, and up to 5·3 μ broad when mature. Conidial states of the *Cephalosporium*, *Leptographium*, and *Graphium* types were observed. In the *Cephalosporium* heads the conidia are 2·2 to 3·1 by 1·5 to 2 (average 2·7 by 1·7) μ, and in the other types 4 to 5·2 by 1·9 to 2·2 (4·6 by 2) μ. The brown to black, globose, hirsute perithecia are rare in culture. The ventral diameter is 182 to 273 (221·8) μ and the height 182 to 273 (218) μ. The black neck is 539 to 700 (638) μ long, 39·2 to 60·2 (48·6) μ broad at the base, and 15·4 to 28 (24·5) μ at the top. The hyaline, unicellular, thin-walled, bean-shaped ascospores measure 4 to 5·3 by 2·1 to 3 (4·6 by 2·5) μ with the brim and 3·2 to 4·2 by 1·7 to 2·1 (3·6 by 1·9) μ without.

Both species grew on Scots pine, spruce, and Japanese larch wood, the former causing blackish-grey discoloration on all three and the latter a greyish-blue colour severe on pine, mild on spruce, and feeble or none on larch. *C. coerulescens* caused severe blueing on pine. *C. wilsoni* did not infect sterile wood. It is heterothallic.

In a review of the nomenclature of *Ceratocystis* and *Ceratostomella* and related genera, the former name is considered applicable to species with deliquescent asci and irregularly arranged unicellular ascospores, and the latter is to be retained for

those with persistent asci and monostichous ascospores which can become triseptate. Thus *Ceratocystis fimbriata* is accepted for *Ceratostomella fimbriata* and *Rostrella coffeae* [ibid., 30, p. 366].

HUSSAIN (S. M.). **Some observations on Fomes conchatus (Pers. ex Fr.) Gill.**—*Pakistan J. For.*, 1, 2, pp. 148–150, 1 pl., [? 1951].

Fomes conchatus [*R.A.M.*, 26, p. 429] produces a serious heart rot in several hardwood species in Pakistan, including *Lonicera quinquelocularis* and oak species in the Murree Hills and the forests of Patriata. It has also been recorded on *Rhus cotinus* in India. The fungus attacks the sapwood and heartwood of living trees through wounds.

JACKSON (H. S.). **Studies of Canadian Thelephoraceae. V. Two new species of Aleurodiscus on conifers.**—*Canad. J. Res.*, Sect. C, 28, 1, pp. 63–77, 2 pl., 2 figs., 1950.

A further contribution to this series [cf. *R.A.M.*, 29, p. 123] includes descriptions of *Aleurodiscus minnsiae* n.sp., occurring commonly on *Tsuga canadensis* in the north-east of North America and also on other conifers elsewhere, and of *A. pini* n.sp. on *Pinus strobus*. Both species have been under observation for several years. *A. minnsiae* is distinguished by a 'splash cup' sclerotial state originally referred to as *Minnsia carnea* [nom. nud.].

ZOBRIST (L.). **Zehn Jahre Versuche zur Bekämpfung des schwarzen Schneeschimmels Herpotrichia nigra Hartig.** [Ten years' experiments in the control of the black snow mould *Herpotrichia nigra* Hartig.]—*Schweiz. Z. Forstw.*, 101, 12, pp. 632–642, 7 figs., 1950. [French summary.]

Following an account of the symptomatology and biology of *Herpotrichia nigra* on spruce, pine, and other conifer needles in Switzerland, the conclusions drawn from ten years' experiments on its chemical control [*R.A.M.*, 29, p. 183] are summarized and the relevant data tabulated. Two factors are essential for the assumption of the parasitic habit by the fungus, namely, a favourable temperature range (minimum 0°, optimum 15°, maximum 24° C.) and a continuously saturated atmosphere during the first phase of development. These conditions coincide in a supreme degree under a snow cover of 60 cm. and upwards persisting for months. Thus, a chemical treatment adapted to the biology of *H. nigra* must constitute a sort of 'reserve' therapy, in which the fungicide resists washing off between its application and the onset of the snow, as well as during melting, and retains enough of the active principle to prevent infection beneath the snow cover. These requirements are met by dust No. 3979, supplied by Ciba AG (Basle), an organic fungicide with prophylactic and curative properties which is rendered rain-proof by means of special adjuvants. One or more applications should be given, as the intensity of the attack requires, after transplanting in the autumn, the surface of the surrounding soil as well as the trees themselves being covered. Very desirable also is the treatment of seedlings and young transplants in the nursery.

In one hour 600 ten-year-old spruces in mountain afforestations or 800 to 1,000 four- to six-year-old nursery trees can be dusted with 3 kg. of No. 3979 at a comparatively small outlay, having regard to the magnitude of the damage caused by the fungus.

KIMMEY (J. W.). **Cull factors for forest-tree species in northwestern California.**—*For. Surv. Release, For. Serv. U.S. Dep. Agric.*, 7, 30 pp., 11 figs., 1 graph, 1 map, 1950. [Received May, 1951.]

The author defines the cull factor of forest trees as the amount of cull expressed

as a percentage of the gross volume of tree or stand. Cull indicators [*R.A.M.*, 30, p. 205] are described, sporophores, fire scars, and dead or broken tops being the most useful. A scale of symbols for various types of damage is suggested and the application of cull factors for specified coniferous and hardwood species in north-west California is discussed. The cull factors of 898 defective trees at 67 locations are tabulated. These proved the applicability of Boyce's data [ibid., 11, p. 615] to California. White fir (*Abies concolor*), California red fir (*A. magnifica*), and Douglas fir (*Pseudotsuga taxifolia*) suffer greater damage than most other commercial conifers, *Echinodontium tinctorium* [ibid., 28, p. 430] being common on the two first-named, *Fomes pini* and *Polyporus schweinitzii* on Douglas fir [ibid., 20, p. 552], while *F. officinalis* [ibid., 27, p. 547] is less common on all three trees.

Findlay (W. P. K.). **Presidential address. Tree and timber fungi.**—*Trans. Brit. mycol. Soc.*, 33, 3–4, pp. 195–208, 1 pl., 1950.

In this address the author briefly surveys the history of timber pathology and discusses some of the interesting problems that arise. After a short historical review of the subject in general, he deals in turn with the identification of wood-rotting fungi, their physiology, the effects exercised upon them by light, heat, and desiccation, their metabolic products, the fungal flora of timber in different parts of the world, the delimitation of the genera of the Polyporaceae, and the present state of knowledge of wood-inhabiting fungi other than those causing rots.

Cartwright (K. St G.). **A note on the occurrence of Trametes hispida in England, and its cultural characteristics.**—*Trans. Brit. mycol. Soc.*, 33, 3–4, pp. 332–334, 2 pl., 1 graph, 1950.

A description is given of the cultural characters of *Trametes hispida* [cf. *R.A.M.*, 10, p. 113; 20, p. 309; 22, p. 233] isolated in 1949, apparently for the first time in Britain, from a sporophore on a beech railway sleeper of apparently home-grown timber stored in the open at Liphook, Hampshire. The fungus, which caused a rapid, white, stringy rot with black flecks under wet conditions, grew at 5° to 42° C. with an optimum at 34°.

Proceedings of the American Wood-Preservers' Association, 1950.—586 pp., 8 pl., 25 figs., 13 graphs, 18 charts, 2 maps, 1950.

This volume [see next abstract] contains much valuable information on timber preservation in the United States, test methods, standard practices, and so forth. In addition to reports of committees dealing with these and related matters, it also presents papers on, *inter alia*, the analysis of creosote–petroleum solutions, drying lumber by the vapour process, the wood-preserving industry and timber, and the fire resistance and slow-burning characteristics of pressure-creosoted piles and timbers in substructures of piers and wharves.

Burton (W. J.). **Treated wood on the Missouri Pacific Railroad.**—*Proc. Amer. Wood Pres. Ass.*, 46, pp. 252–260, 2 figs., 2 graphs, 1950.

For the five years ending with 1910 the annual average of renewals of untreated sleepers on the Missouri Pacific Railroad was 359 per mile. The average sleeper then cost 55 cents, but in 1948 the total cost of a creosoted sleeper was $2.55, of which the sleeper itself accounted for $1.70. The total cost for 359 untreated sleepers would thus be $610.33 per mile. For the five years ending with 1948 annual renewals, however, averaged only 124 per mile, making a renewal cost in 1948 for treated sleepers of $318.20 per mile. On the 8,899 miles of 1948 this saving totalled $2,599,465. Similar savings are resulting from the use of creosoted trestle and other timber [cf. *R.A.M.*, 29, p. 4].

Versammlungsberichte. Deutsche Gesellschaft für Holzforschung am 26. und 27. September 1950 in Marburg/Lahn. [Reports of meetings. German Association for Timber Research on 26th and 27th September, 1950, at Marburg (Lahn).]—*Angew. Chem.*, 62, 22, pp. 540–541, 1950.

According to G. KRUG, the 27 timber-preserving plants of the Ruhr use predominantly U-salts (mixtures of chromates, fluorides, and dinitrophenol), followed by silico- and hydrogen fluorides and coal tar oil, for the impregnation of mine timbers [*R.A.M.*, 29, p. 592]. Day temperatures in the mines invariably permit of fungal growth and are often highly favourable to it. At 89 per cent. relative humidity growth becomes possible and reaches a peak at 94 per cent. Although the timber consumption of the mines has fallen of late years from 63 to 27 cu. m. per 1,000 tons of coal, chemical treatment is dictated by the enormous demands of the industry and the incidence (exceptionally high in places) of decay.

G. SCHULZ presents two methods of testing chemicals for the control of blue stain [of unspecified origin: ibid., 29, p. 594]. Kiln-dried wood [ibid., 24, p. 347] soaked in 1 per cent. malt extract is equally satisfactory with green material as a medium and gives the same *doses toxicae* (e.g., 0·4 to 0·6 per cent. for pentachlorophenol-sodium). Chips excised with an increment-borer are saturated with the chemical, inoculated, and incubated in a test tube for three to five days. The different blueing fungi have been shown to vary greatly in their resistance to toxicants, so that it is essential to use several species.

Schikorr's method (Materialprüfungsamt, Berlin–Dahlem) of testing wood preservatives for their corrosive properties [cf. ibid., 7, p. 212; 29, p. 446] has been found useful in K. STUMPP'S experiments with iron, in which the fluorides, zinc chloride, and a number of commercial preparations proved to be free from this defect. The performance of the zinc silicofluorides varies with their degree of purity. Magnesium silicofluoride corrodes strongly and the bifluorides very strongly.

HOCHAPFEL (H.). **Ein stärkeres Auftreten des falschen Rübenmehltaus bei Zuckerrüben im Zusammenhang mit dem Samenrübenanbau in Nordbaden.** [A rather severe outbreak of Beet downy mildew in Sugar Beets in relation to seed Beet cultivation in northern Baden.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), 2, 8, pp. 124–125, 2 figs., 1950.

The first record of beet downy mildew (*Peronospora schachtii*) [C.M.I. map No. 28] in Germany [*R.A.M.*, 2, p. 484] dates from 1854, when it was observed on fodder crops in Lower Silesia. Since then the principal extension of the disease has been in Saxony, but in 1949 it was prevalent from June onwards in northern Baden, where sugar beet crops adjacent to fields of seed plants (in which the pathogen overwinters) sustained reductions of 25 to 30 per cent. At a distance of 100 to 200 m. in the direction of the prevailing wind the losses fell to 7 to 8 per cent., while 1 km. away from the focus of infection they were only 1 per cent. Elsewhere at 500 to 1,000 m. from the source only isolated plants were attacked. Control should be based on the correct siting of the beet and steckling fields in relation to the prevailing wind and sufficiently far away from seed plants.

GIDDINGS (N. J.). **A method of testing some plants for curly top.**—*Phytopathology*, 41, 5, pp. 475–476, 1951.

The leafhopper vectors [*Eutettix tenella*] of [beet] curly top virus [*R.A.M.*, 29, p. 548] do not live long or feed well on wilted plant tissue, and considerable difficulty has therefore been experienced in testing specimens, e.g., of cucurbit or tomato [ibid., 30, p. 492] plants, collected in the field or arriving from a distance at the Bureau of Sugar Plant Investigations, Riverside, California. Non-viruli-

ferous leafhoppers caged on cut blocks of watermelon fruit tissue (comprising the rind and some of the inner tissue), which were then covered with Baudruche Capping Skins (*Phytopathology*, 18, pp. 246–247, 1928), survived better than a similar batch fed on portions of shoot, and they readily infected sugar beet test plants. The best results are obtained with melon tissue that is not fully ripe. Tomato fruits may be similarly handled. Another satisfactory method is to squeeze the juice from a small quantity of tomato pulp through fine cloth, percolating it through filter paper, adding sucrose solution to the equivalent of 5 per cent. sugar, and using drops of this material on feeding membranes at high temperature, as described by Bennett [*R.A.M.*, 14, p. 549].

Bockmann (H.). **Über Fusskrankheiten an Erbsen.** [On foot rots of Peas.]—*Z. PflKrankh.*, 57, 9–10, pp. 327–334, 3 figs., 1950.

In Germany the term 'pea foot rots' usually includes St. John's wilt caused by species of *Fusarium* [*R.A.M.*, 14, p. 613], *Ascochyta* foot rot (*A. pisi* and *A. pinodella*) [ibid., 30, pp. 184, 400], and the root and stem rot (associated with various fungi), which the author considers to be the only typical foot disease, as it is confined to the lower part of the stem.

In experiments conducted at the Institute for Cereals, Oil Fruit, and Vegetables, Kitzeberg, in 1948 and 1949 isolations from diseased pea plants with browning at the stem base and in the roots yielded *F. solani* var. *martii* [ibid., 30, p. 299] most commonly. *Rhizoctonia* [*Corticium*] *solani* [ibid., 18, p. 831] occurred frequently and unimportant blackening fungi of the genera *Cladosporium* and *Alternaria* were also present. On seeds originating from various sources, besides the blackening fungi, *Ascochyta* spp. were very common, *Fusarium* spp. occurred less frequently, and *Corticium solani* not at all. The results of greenhouse and field soil inoculation tests demonstrated that *C. solani* isolates were the most virulent. They decreased germination, caused severe infections, and reduced the yields by more than 50 per cent. on an average. Sometimes all the plants were killed. The symptoms agreed with those of root and stem rot; dark brown spots, not usually sharply delimited, appeared at the foot of the plants. They rapidly encircled the whole stem base, often resulting in the collapse of the plant. The roots also turned brown and died. With the *Fusarium* species (especially *F. solani* var. *martii* and *F. arthrosporioides*) mild infections developed in a few cases only, indicating their weak pathogenicity. However, their importance should be investigated further.

In tests in which green parts of pea plants were added to the soil, severe infections similar to those caused by *C. solani* were produced. A mycelium was observed on most of the dead seedlings and *C. solani* was isolated from several. It is possible that the green plant parts in the soil favour the development of the fungus [cf. ibid., 30, p. 452], a hypothesis which appears important in connexion with crop rotation.

Beaumont (A.). **On the Ascochyta spot disease of Broad Beans.**—*Trans. Brit. mycol. Soc.*, 33, 3–4, pp. 345–349, 1 pl., 1950.

The pycnidia of the *Ascochyta* found on broad bean plants in Devon [*R.A.M.*, 9, p. 287; 11, p. 143] measured mostly 120 to 150 (range 80 to 200) μ in diameter, with an ostiole 30 to 50 μ wide, and the uniseptate pycnidiospores 15 to 18 by 4 to 5 (range 12 to 23 by 4 to 6) μ. In culture the spores were 14 to 23 by 3 to 6 μ and were commonly 2- or 3-septate. This fungus is known to differ from *A. pisi* [ibid., 26, p. 374, and preceding abstract] in several respects, including its appreciably larger spores. In cross-inoculations with spore suspensions the bean fungus gave nine out of nine infections on bean and only two out of 13 on pea, while the

pea fungus infected two of 25 bean plants and five of seven pea. In the two successful inoculations with the bean fungus on pea, pycnidia appeared in one only, and these contained large spores characteristic of the bean *Ascochyta*, typical cultures being obtained from them. In the two successful inoculations with the pea organism on bean, only one developed pycnidia, and these had spores characteristic of *A. pisi*. Following seed inoculations the pea fungus caused infection on the one pea plant used and none of three bean, and the bean fungus none of five pea and one of three bean [cf. ibid., 10, p. 284]. In view of all the evidence, the author concludes that the bean fungus is a distinct species for which the name *A. fabae* should be retained. The only satisfactory method of preventing the disease is to use clean seed from healthy crops.

THOMAS (H. R.), ZAUMEYER (W. J.), & JORGENSEN (H.). **Inheritance of resistance to Lima-Bean mosaic virus in the Lima Bean.**—*Phytopathology*, 41, 3, pp. 231–234, 1 fig., 1951.

In crosses made at the Plant Industry Station, Beltsville, Maryland, between varieties of Lima bean (*Phaseolus lunatus*) to determine the inheritance of reaction to Lima bean mosaic virus (*Marmor cucumeris* var. *phaseoli*) [strain of cucumber mosaic virus: *R.A.M.*, 25, p. 431], the F_1 plants from Fordhook (resistant; plants remained healthy) × Sieva (susceptible) were resistant. Segregation in the F_2 and F_3 generations when the resistant parent was Fordhook or Peerless and the susceptible one Triumph or Sieva showed that the inheritance of resistance in Fordhook and Peerless is controlled by two dominant complementary factors.

ANDERSEN (A. L.). **Observations on Bean diseases in Michigan during 1949 and 1950.**—*Plant Dis. Reptr*, 35, 2, pp. 89–90, 1951. [Multilithed.]

In 1949 the extensive dry bean industry in Michigan suffered serious losses from diseases. *Colletotrichum lindemuthianum* [*R.A.M.*, 29, p. 499] attacked navy beans [*Phaseolus vulgaris*] in Sanilac and St. Clair counties and cranberry beans in Montcalm county, while the bacterial blights (*Xanthomonas phaseoli* [ibid., 29, p. 600] and its var. *fuscans* [ibid., 27, p. 510]) were common in Tuscola and Gratiot counties.

Since the pathogens are seed-borne and most growers produce their own seed or use non-certified local seed, the diseases recurred in 1950, favoured by heavy rains during the summer. The premature defoliation of bean plants probably reduced yields in the affected areas by more than 50 per cent. Unfavourable weather conditions in September prevented harvesting and severe weathering caused further damage, especially to infected plants. In Tuscola, Saginaw, and Gratiot counties 30 to 40 per cent. of the reduction in total yield was directly or indirectly due to bacterial blights, representing a loss of $3,500,000 to the growers. In the counties where anthracnose was prevalent approximately 60 per cent. of fields were affected, causing yield reductions of 50 per cent. (estimated loss $1,400,000) with additional losses due to weathering. Many fields in Huron county had 50 to 90 per cent. of the plants killed by *Sclerotinia sclerotiorum* [ibid., 30, p. 207]. The fields that suffered most were those in which lucerne or clover had been turned under prior to the planting of beans, or those which were heavily fertilized. About 5 to 10 per cent. of the total crop ($50,000) was lost owing to the disease.

Garden bean crops, grown on a small scale, were reduced by *Pythium butleri* [*P. aphanidermatum*: ibid., 30, p. 445], which reduced stands by 20 to 30 per cent., and anthracnose which attacked the new variety Topcrop in Montcalm county.

Timnick (Margaret B.), Lilly (V. G.), & Barnett (H. L.). **Factors affecting sporulation of Diaporthe phaseolorum var. batatatis from Soybean.**—*Phytopathology*, 41, 4, pp. 327–336, 1 fig., 1 graph, 1951.

At the West Virginia Agricultural Experiment Station, inositol (for which *Diaporthe phaseolorum* var. *batatatis* [*R.A.M.*, 28, p. 107] proved partially deficient), thiamine, biotin, and pyridoxine caused an appreciable increase in perithecial production only on media containing lactose as the source of carbon. Larger numbers of fructifications were formed in a shorter period on natural soy-bean media (stems and pods in water agar) than on synthetic agars. Five one-minute exposures on alternate days to ultra-violet irradiation by a 15-watt G.E. germicidal lamp (2537 Å) stimulated perithecial formation on a glucose casein hydrolysate medium, but inhibited it on whole wheat, malt extract, and potato dextrose agar media. Alternating light and darkness was much more favourable for perithecial formation than either continuous light or continuous darkness, the results of exposure to a protracted spell of light followed by darkness or vice versa being intermediate. Small, discrete pycnidia, containing almost exclusively beta spores measuring 8 to 16 μ in length [cf. ibid., 13, p. 270], were formed on most media except in continuous darkness; on potato dextrose agar their number was greatly increased by continuous light and ultra-violet irradiation. Only on soy-bean stems and pods were alpha spores produced in abundance.

Murakishi (H. H.). **Purple seed stain of Soybean.**—*Phytopathology*, 41, 4, pp. 305–318, 3 figs., 1951.

The results of symptomatological, morphological, and cultural studies at the North Carolina Agricultural Experiment Station have confirmed the identity of the fungus causing purple stain of soy-bean seed in the State with *Cercosporina kikuchii* [*R.A.M.*, 29, p. 489]. The following observations refer to fructifications on diseased plant organs, since no sporulation has hitherto occurred on any of the culture media tested. Light to medium brown, fasciculate conidiophores, 36 to 296 by 3·2 to 6·1 (average of 100, 157 by 4 to 6) μ, becoming geniculate, give rise to straight or curved conidia, acute at the apex, truncate to subtruncate at the base, 38·8 to 445 by 1·3 to 6·1 (210 by 3·3) μ, furnished with 2 to 49 septa. They germinate in three to four hours on dextrose agar.

The results of inoculation experiments showed that unwounded, detached pods may contract purple stain under very humid conditions, but injuries in the pod wall greatly increase the risk of infection. Germinating purple-stained seeds of the Arksoy, S–100, and Rose Non Pop varieties, grown in sterilized soil at a high level of relative humidity, developed conidia on the lesions which were spreading from the seed coats to the cotyledons and thence to the hypocotyls. Ten days later purple spots were observed on the primary leaves, and shortly afterwards new infections appeared on the secondary leaves and on the stems and petioles.

C. kikuchii was largely inactivated by one hour's immersion of purple seeds in water heated to 48° C., which reduced the incidence of the defect from 63 to 2 per cent. but simultaneously lowered the germination rate from 90 to 70 per cent.

Nugent (T. J.), Fenne (S. B.), & White (W. C.). **Seed treatment and seed inoculation studies with Soy-Beans.**—*Plant Dis. Reptr*, 35, 2, pp. 82–83, 1951. [Multilithed.]

A field test was carried out at Norfolk, Virginia, in 1950, to determine the effect on soy-beans of seed inoculation with nitragin [*R.A.M.*, 28, p. 266] and seed treatment with arasan (3 oz. per 100 lb.). Arasan alone gave the highest germination, followed by arasan plus nitragin. Root nodulation was heaviest in plants from nitragin-treated seed. The yield differences between treatments were not

significant, although arasan plus nitragin increased the average acre yield by approximately 1 bush. over the control and about 2 bush. over nitragin alone.

LINN (M. B.). **Control of smut in bulb Onions by pelleting the seed with technical thiram.**—*Plant Dis. Reptr*, 35, 2, pp. 94–96, 1951. [Multilithed.]

In 1950 tests were carried out at the University of Illinois Plant Pathology Department with various thiram-containing fungicides for the control of onion smut [*Urocystis cepulae*: *R.A.M.*, 29, p. 500]. The seed was placed in a flask, moistened thoroughly with a sticker (methocel-glycerin), the fungicide added, and the whole stirred and shaken repeatedly. It was then allowed to dry for at least 24 hours prior to planting. The weather was ideal for the development of the fungus and the field had a high smut potential. Following technical thiram at 100, 75, and 50 per cent. dosage levels, 19·6, 21·5, and 30·5 per cent. smutted plants, respectively, were present in September at harvest, the untreated having 85·4; the corresponding percentages for arasan, tersan, and arasan SF at 100 per cent. dosage level were 45·7, 46·7, and 43·4.

ELLIS (E. A.). **Flora and fauna of Norfolk—Miscellaneous observations.**—*Trans. Norfolk Norw. Nat. Soc.*, 17, 2, pp. 136–143, 1951.

During June, 1950, *Puccinia opizii* [*R.A.M.*, 26, p. 407] was observed on lettuces throughout an area south-east of Norwich and in one locality in Suffolk. This is the first record of the rust attacking lettuce in Britain.

ELLIS (D. E.). **Noteworthy diseases of cucurbits in North Carolina in 1949 and 1950.**—*Plant Dis. Reptr*, 35, 2, pp. 91–93, 1951. [Multilithed.]

In July, 1949, cucumbers over 3 in. long of the variety Earliest of All in Pitt county, North Carolina, developed a rather firm, dark, watersoaked rot caused by *Rhizoctonia* [*Corticium*] *solani*; smaller fruits showed a yellowish-brown, superficial discoloration. Diseased cucumbers held in moist chambers rotted rapidly and after 24 hours were covered with a dense aerial mycelium. In laboratory inoculation tests nine single-hyphal tip isolates proved highly pathogenic to healthy National Pickling cucumbers. The first symptoms appeared after 24 hours; after 72 hours entire fruits were almost completely rotted, and after five days they broke down completely. Inoculated cucumber seedlings developed severe damping-off [*R.A.M.*, 30, p. 89].

The cucumber fungus grew more rapidly than several *C. solani* isolates from other hosts. In preliminary tests the optimum temperature, both for growth of the fungus and disease development, was 28° C. or above [cf. ibid., 30, p. 258]. It infected tomato and [chilli] pepper fruits, causing symptoms resembling soil rot on these hosts. It appears that this is the first record of *C. solani* causing fruit rot of cucumbers.

Late plantings of squash in Henderson county suffered serious losses from scab (*Cladosporium cucumerinum*) [ibid., 29, p. 454; 30, p. 356] in 1949. In 1950, when scab was less severe but developed rather abundantly late in the season, the best control in a preliminary spray test at the Mountain Vegetable and Fruit Station, Hendersonville, was given by 2 in 100 parzate, which allowed only 5 per cent. of scabbed fruit in the three last pickings, compared with 35·8 for the untreated. It also increased yields significantly. Powdery mildew (*Erysiphe cichoracearum*) [ibid., 29, pp. 191, 498], which also occurred at the end of the season, was very effectively controlled by actidione (10 p.p.m.) [ibid., 30, p. 407] and 1 in 100 cuprocide plus cottonseed oil (1 gal. per 100 gals.); the latter, however, was phytotoxic.

Downy mildew (*Pseudoperonospora cubensis*) [ibid., 30, pp. 443, 451] developed more slowly on susceptible cucumbers than on melon in 1950, and damaged the latter

much more severely in the Ridgeway area. This unusual behaviour of the fungus suggests the possible presence of physiologic races [ibid., 30, p. 356]. The fact that Palmetto cucumber, resistant in South Carolina, was rather seriously affected in Duplin and Pender counties, even where no susceptible varieties were interplanted, tends to support the hypothesis.

Gummy stem blight, caused by *Mycosphaerella citrullina* [ibid., 28, p. 48; 30, p. 302], was responsible for severe defoliation of watermelons in some plantings in Wake and Warren counties in 1949. The fungus was associated with blossom-end rot, and also caused leaf spot of melon.

Anthracnose (*Colletotrichum lagenarium*) [loc. cit. and ibid., 29, p. 454] caused serious cucumber losses in 1950, especially to pickling varieties, where the seed was not treated with mercuric chloride solution [ibid., 28, p. 48]. In test plantings the new Congo watermelon was highly resistant.

Bacterial wilt (*Erwinia tracheiphila*) [ibid., 28, p. 26] caused losses of from 2 to 20 per cent. in plantings in Chowan and Pasquotank counties in 1949.

Jacoway (T. H.) & Owen (J. H.). **Stem rot of Peanuts.**—Abs. in *Phytopathology*, 41, 1, p. 19, 1951.

A species of *Diplodia* morphologically and physiologically identical with *D. natalensis* causes up to 30 per cent. infection in some groundnut fields in the Georgia–Florida area [cf. *R.A.M.*, 26, p. 130; 27, p. 60]. The perfect state of the fungus has not developed in culture or been found in nature. The invaded tissues, which may be situated anywhere on a runner or the central stem, are brown at first, turning black and necrotic later. Pycnidia have been detected only on the stems. The groundnut strain of the fungus is pathogenic to watermelon, orange, and sweet potato. Infection of field-plot groundnuts resulted from inoculation through wounds with spore suspensions and mycelium.

Herter (G.). **Champignons comestibles (Fungi edules).** [Edible fungi (Fungi edules).]—vi+203 pp., 101 pl., Paris, Paul Lechevalier, 1951.

Edible fungi of 101 species, arranged in families under their Latin names, followed by the synonymy and the common names in French and German, are described and figured, with brief notes on their habitat, culinary usefulness, and the respects in which they differ in appearance from similar poisonous species.

Baldacci (E.) & Orsenigo (M.). **Quattro anni d'impiego del calendario d'incubazione della Peronospora della Vite (1946–1949).** [Four years' use of the incubation calendar for the Vine *Peronospora* (1946 to 1949).]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 8, 3, pp. 89–134, 2 diags., 3 graphs, 1 map, [? 1950. Received January, 1951.]

Further observations made from 1946 to 1949 in the Po valley by the Pio Istituto Agricolo Vogherese in relation to the incubation period of vine mildew [*Plasmopara viticola*: *R.A.M.*, 28, p. 269; 30, pp. 12, 305] are recorded. The use of the incubation calendar was also tested in other areas. In southern Italy and Sicily the relation of climatic conditions to outbreaks needs further study before the method can be usefully employed.

Nelson (R. E.). **Factors influencing the infection of table Grapes by Botrytis cinerea.**—*Phytopathology*, 41, 4, pp. 319–326, 3 graphs, 1951.

In inoculation experiments at the University of California, Davis, Tokay grapes were infected by *Botrytis cinerea* [*R.A.M.*, 22, p. 194] through the intact skin; openings or injuries were inessential for the process [cf. ibid., 17, pp. 292, 373]. Infection by conidia occurred only when the grapes were kept wet after inoculation for periods varying with the temperature. Thus, under conditions of diurnal

fluctuations, infection of Tokay grapes required a period of 12 to 24 hours at a minimum temperature of 12°, as against 18 to 36 at 2°, the corresponding period for Emperor at the latter temperature being 30 to 60 hours [cf. ibid., 15, p. 701; 17, p. 470]. In the laboratory the moisture periods requisite for infection of stored Emperor grapes were 72 to 84 hours at 3° and 12 to 24 at 16°, above which the incidence of grey mould declined and the length of time necessary for its development increased slightly up to the virtual cessation of attacks at 35°.

The sugar content of non-infected grapes was significantly lower (14·1 to 21·2, mean 18·2 per cent.) than that of the sound tissue of diseased ones in the same cluster (16·2 to 23·3, mean 19·3), suggesting a correlation between a high sugar content and susceptibility to *B. cinerea*.

Ross (A. F.) & Williamson (C. E.). **Physiologically active emanations from virus-infected plants.**—*Phytopathology*, 41, 5, pp. 431–438, 3 figs., 1951.

In experiments at Cornell University, Ithaca, New York, leaves of *Nicotiana glutinosa* and *Datura stramonium* inoculated with tobacco mosaic virus, of Scotia bean (*Phaseolus vulgaris*) with lucerne mosaic virus, of Turkish tobacco with tobacco ring spot virus, of potato seedling 41956 with potato virus Y, and of *Gomphrena globosa* with potato virus X produced a physiologically active emanation, presumably ethylene [cf. *R.A.M.*, 30, p. 230], which was detected and measured biologically by the triple response of etiolated Alaska pea seedlings. Ethylene production reached a maximum in leaves inoculated with viruses forming numerous large, necrotic lesions and appeared to be the result rather than the cause of necrosis. In *Physalis floridana* plants inoculated with potato virus Y [ibid., 28, pp. 78, 237] ethylene production was much more copious at 70° F., a temperature conducive to the development of necrosis, than at 80°, which favours virus multiplication without the accompaniment of necrosis. Epinasty was observed in all the host–virus combinations except those involving bean and tobacco, assuming a mild form in *N. glutinosa* and a marked character in *G. globosa*, *D. stramonium*, and potato.

Takahashi (W. N.). **A ground glass homogenizer for preparing virus samples from plant tissue.**—*Phytopathology*, 41, 5, pp. 481–482, 1 fig., 1951.

At the University of California, Berkeley, a tapered, self-fitting, ground glass homogenizer has proved useful in the preparation of virus samples, especially from small pieces of either fresh or frozen plant tissue [cf. *R.A.M.*, 29, p. 177; 30, p. 207, *et passim*]. Two continuous grooves, extending from the shoulder round the base and up the opposite side, are cut in each pestle to supply liquid to the grinding surface and act as gross cutting edges. To prevent the compacting of unhomogenized tissue at the bottom of the apparatus, the base of the pestle should be rounded and fit neatly into the rounded bottom of the mortar cavity. The pestle may be operated manually or by a cone-drive motor.

De Bruyn Ouboter (Maria P.), Beijer (J. J.), & Van Slogteren (E.). **Diagnosis of plant diseases by electron-microscopy.**—*Antonie van Leeuwenhoek J. Microbiol. Serol.*, 17, 3, pp. 189–208, 16 pl., 1951.

Details are given of the electron microscope technique developed at the Laboratory for Flower Bulb Research, Lisse, Holland, for the diagnosis of the agents of plant diseases [*R.A.M.*, 29, p. 231; 30, pp. 305, 404]. Electron micrographs are given of *Xanthomonas hyacinthi* from hyacinths suffering from yellow disease, *Bacterium carotovorum* [*Erwinia carotovora*] from Arentine Arendsen hyacinths, potato viruses X [? from potato: ibid., 29, p. 474] and Y from tobacco, tulip virus 1 [tulip breaking virus] from tulip petals, an unknown rod-shaped virus causing white spots on tulips transmitted to tobacco, possibly rattle virus of tobacco

[ibid., 28, p. 87], an unknown rod-shaped virus from daffodils [*Narcissus pseudonarcissus*] transmitted to tobacco, *Phaseolus* virus 2 [bean yellow mosaic virus: ibid., 30, p. 91], carnation yellow mosaic virus, tobacco mosaic virus from tomatoes [ibid., 28, p. 438; 29, pp. 127, 403], tobacco necrosis virus [ibid., 26, p. 358] from tulip transferred to tobacco, and a cucumber virus accepted as cucumber virus 1 [cucumber mosaic virus: ibid., 26, p. 478], but with only round particles, which caused large discolorations on tobacco. A similar virus from chrysanthemum transmitted to tobacco also had only round particles.

KIŠPATIĆ (J.). **Prilog poznavanju parasitske mikoflore Hrvatske.** [Contribution to a knowledge of the Croatian parasitic mycoflora.]—*Glasn. hrv. prirodosl.*, Ser. II/B, 2–3 (*1948–1949*), pp. 44–50, 1950. [English summary.]

In this list of pathogenic fungi occurring in Croatia, Yugoslavia, the following are of note: *Peronospora candida* on a *Primula* sp.; *P. schleideni* [*P. destructor*: *R.A.M.*, 28, p. 546] on onion; *Mycosphaerella fragariae* on strawberry [C.M.I. map No. 110]; *M. mori* on mulberry [*R.A.M.*, 29, p. 404]; *Dothichiza populea* on poplar (*Populus canadensis*) [ibid., 19, p. 68]; *Pseudopeziza ribis* on black currant [C.M.I. map No. 187]; *Phoma betae* on beet [*R.A.M.*, 29, p. 201]; *P. destructiva* and *Septoria lycopersici* (common) on tomato [ibid., 21, p. 404; C.M.I. map No. 108]; *S. tritici* (very widespread) on wheat [*R.A.M.*, 30, p. 194]; *S. linicola* on flax, imported from America [ibid., 27, p. 554]; *S. piricola* [*M. sentina*: ibid., 30, p. 328] on pear; *Coniothyrium diplodiella* on vine [ibid., 29, p. 286]; *Colletotrichum lagenarium* [ibid., 15, p. 698] on melon; *Cercospora concors* [C.M.I. map No. 112] on potato; *Fusicladium* [*Venturia*] *cerasi* [ibid., No. 196] on peach; *Cladosporium cucumerinum* [*R.A.M.*, 29, p. 404] on cucumber; *Piricularia oryzae* [C.M.I. map No. 51] on rice; *Heterosporium gracile* [*Didymellina macrospora*: *R.A.M.*, 29, p. 215] on *Gladiolus*; *Ceratophorum setosum* on lupin [ibid., 29, p. 29]; and *Phyllosticta sojaecola* on soy-bean [ibid., 24, p. 5].

Annual Report of the Director, Experimental Farms Service, 1949–1950.—87 pp., 9 figs., 1 map, Department of Agriculture, Ottawa, Canada, 1951.

This report [cf. *R.A.M.*, 29, p. 457] contains, *inter alia*, the following items of interest concerning plant diseases in Canada during the period under review. In 1949 oats in the Maritime Provinces developed a blackening and rotting of the basal culm area which caused severe breaking of the straw; the causal organism was tentatively identified as *Septoria avenae* [*Leptosphaeria avenaria*: ibid., 30, p. 311]. In barley breeding work crosses were made between the agronomically desirable varieties Montcalm and Ottawa 3092/A (Velvet × Olli × O.A.C.21) and also Velvon II, Anoidium (resistant not only to the races of loose smut (*Ustilago nuda*) [ibid., 30, p. 407] hitherto commonly present, but also to the newer races which are attacking such varieties as Titan [cf. ibid., 15, p. 288; 22, p. 162]), Valentine (which combines resistance to stem rust [*Puccinia graminis*: cf. ibid., 26, p. 388; 27, p. 553; 28, p. 624; 29, p. 142] and smut), and hybrids with combined resistance to leaf rust [*P. hordei*: loc. cit. and cf. ibid., 27, pp. 15, 561; 28, p. 519], stem rust, and mildew [*Erysiphe graminis*]. Ottawa 3092/A has yielded well, is resistant to loose smut, and appears to be moderately resistant to stem rust and common root rot (*Helminthosporium sativum*) [cf. ibid., 28, p. 520].

Congressional creeping bent [*Agrostis palustris*] proved resistant to snow mould (*Typhula* spp. and other organisms) [cf. ibid., 23, p. 491] in the spring of 1948, when injury was very severe on all other strains and the Washington strain was completely killed. Congressional had only 5 per cent. superficial infection; it began active growth two weeks before all other strains and retained its bright green colour late in the autumn. In 1949 infection was lighter and Congressional remained unaffected. Spring fungicidal treatments are ineffective; applications should be

made as late as possible in the autumn, preferably just before the first persisting snow. Fungicides are equally effective when applied in solution or as a suspension, sprayed or sprinkled or dry-mixed with sand or other carrier, provided distribution is uniform.

Progress in lucerne breeding against bacterial wilt [*Corynebacterium insidiosum*] has been rapid; much potential parent material which is highly resistant or immune has been isolated. Lucerne winter crown rot [caused by an unidentified Basidiomycete: ibid., 27, p. 324] is widespread throughout the northern prairie areas. Resistant plants have been tested for suitability as parent material and selections are being developed into new varieties.

A programme for indexing and testing all strawberry varieties grown in Canada and possible new introductions for the presence of virus disease was drawn up in 1948 and is now in operation. A good proportion of the Elgin and Louise plants so far tested have produced no symptoms on the East Malling indicator strains [cf. below, p. 524] and therefore appear to be free from virus. This result is considered to vindicate the policy of roguing on a basis of plant vigour advocated and practised by the Horticulture Division for a number of years. Without exception all plants of several English varieties and of British Sovereign from British Columbia were virus-infected, though apparently healthy.

The black currant varieties Crusader and Coronet, immune from rust [*Cronartium ribicola*: ibid., 29, p. 105], are, under most conditions, unable to pollinate themselves or one another. Rustless selection *0–396* is, however, a very free pollen-producer, will set fruit on both the foregoing, is self-pollinating, and is at least equal to them in yield and all other respects. It is being multiplied as quickly as possible. Breeding for resistance to rust and aphids in red currants is in progress; Viking [loc. cit.] and the wild species *Ribes diacantha* are being used as parents. One seedling from Viking × Stephens No. 9 is completely resistant to rust and appears to be highly resistant to aphids.

The promising Fredericton Seedling F. 391 potato has displayed very high resistance to late blight [*Phytophthora infestans*: cf. ibid., 29, p. 143] under very severe conditions of infection in Nova Scotia and New Brunswick. Fredericton Seedling F. 431 has shown high resistance under various conditions.

Experiments on the control of apple superficial scald [ibid., 30, p. 17] by the use of canisters of activated charcoal [cf. ibid., 29, p. 314] demonstrated that when apples are stored in open trays with or without the canister, incidence is almost negligible, that air conditioning or purification is useless when the container is as impervious as a barrel, and that canisters reduce scald somewhat when the apples are stored in orchard boxes. The effect is more marked when only one variety is stored in the room, reduction amounting to 80 per cent. in Wagener apples stored alone and 30 per cent. when mixed varieties were used. Wagener apples in oiled wraps developed no scald. The canisters gave a remarkable degree of taint prevention, even where the incidence of rotting was high; they also prolonged storage life from the standpoint of reduced rates of softening and flavour loss, the storage life of the Lawfam variety being increased by one month in these respects.

Burley tobacco strain 37003, from a cross between Harrow Velvet and Green Briar, shows high resistance to black root rot [*Thielaviopsis basicola*: ibid., 30, p. 435] and brown root rot [ibid., 29, p. 458]. Dark tobacco strain 5058 grown on a small commercial scale in 1949 is moderately resistant to *T. basicola*.

McIntosh (A. E. S.). **Annual Report of the Department of Agriculture, Malaya, for the year 1949.**—87 pp., 1 col. map, 1951.

In this report [cf. *R.A.M.*, 29, p. 11] it is stated (p. 30) that attacks of rice blast (*Piricularia oryzae*) were generally slight. The disease was found in new localities in Negri Sembilan, Selangor, Johore, and Perak. In trials carried out in dry

nurseries at the Research Laboratories, Kuala Lumpur, spraying at four-day intervals with Bordeaux mixture, perenox, spersul, and Shell copper fungicide alone or with white oil all partially controlled the disease. *Piricularia* spp. morphologically similar to the blast organism [loc. cit.] caused leaf spots on *Oryza minuta* and *Brachiaria mutica*. Other diseases on rice were *Corticium solani* [ibid., 27, p. 154], especially noticeable in Negri Sembilan and Johore, and *Leptosphaeria salvinii* [ibid., 26, p. 415; 30, p. 405], present chiefly in Kedah.

A stunting disease known locally as 'penyakit merah' (red sickness) causes dark purple or rusty red discoloration of the leaves, and may result in death. It has been recorded from widely separated localities and appears to be non-parasitic.

On oil palms (p. 37) only a few cases of stem rot (*Fomes noxius*) were reported during the year; *Helminthosporium* sp. attacked the seedlings, killing off large areas of the young leaves as they emerged from the buds. Symptoms of anthracnose developed on the fruits of one selection at the Federal Experiment Station, Serdang. On the black, sunken areas which appeared at the apex and spread downwards *Glomerella cingulata* was very common. The disease was probably due primarily to an adverse growth factor.

Red root disease (*Ganoderma pseudoferreum*) continued to be by far the commonest and most destructive root disease of tea. All diseased roots must be removed before replanting badly affected areas. A footnote records that in February, 1950, blister blight (*Exobasidium vexans*) [C.M.I. map No. 45] appeared for the first time in Malaya in the Cameron Highlands area.

G. pseudoferreum was the only root disease of mature cacao. Young trees were killed by *Fomes lignosus* [*R.A.M.*, 29, p. 171].

Large areas of the leaves of young *Durio zibethinus* fruit trees were killed by *C. solani*, accompanied by leaf-shedding and branch die-back. Sclerotia formed profusely on fallen leaves. *Boehmeria nivea* plants were killed by *F. noxius* on an estate in Perak.

Records of vegetable diseases hitherto unknown locally included leaf rot of Indian mustard (*Brassica juncea*) caused by *Sclerotium rolfsii*; downy mildew of turnip (*Peronospora parasitica*); soft rot of mustard, turnip, and *B. alboglabra* caused by *Bacterium carotovorum* [*Erwinia carotovora*]; and mosaic, probably a virus disease, of mustard, turnip, Chinese cabbage, and radish [cf. ibid., 30, p. 354]. Leaf-spotting of cowpea, soy-bean, *Psophocarpus tetragonolobus*, castor oil [*Ricinus communis*], eggplant, and *Luffa* was caused by *Myrothecium* sp.

In a field experiment high dosages of DD (8 and 16 ml. per sq. ft. of soil) applied to tomatoes inhibited the action of *Xanthomonas solanacearum* [ibid., 26, p. 471] to a considerable extent, especially in the early stages of growth. Later, however, all the plants succumbed to the disease. Unripe fruits were rotted by *Phytophthora parasitica*, the first record of this fungus on tomato in Malaya.

In trials at Cameron Highlands of nine potato varieties from Holland resistant to *P. infestans*, all showed resistance under local conditions. So far Voran [ibid., 30, p. 243] appears to be the most successful introduction and grows vigorously.

Wallace (G. B.). **Annual Report of the Plant Pathologist, 1948.**—*Rep. Dep. Agric. Tanganyika, 1948*, pp. 145–147, 1950.

In this report [cf. *R.A.M.*, 29, p. 145; 30, p. 79] it is stated that fructifications of *Armillaria mellea* were observed on a coffee bush [cf. ibid., 29, p. 99] at Lyamungu, Tanganyika, in 1948. Damping-off was again present in coffee cuttings in frames; in addition to *Rhizoctonia* [*Corticium*] *solani* [cf. ibid., 17, p. 345], a *Pythium*, probably *P. debaryanum*, was found. Cotton blackarm [*Xanthomonas malvacearum*: ibid., 27, p. 474; 29, p. 212] was prevalent in the Lake Province. The *Piricularia* causing blast of *Eleusine* [*coracana*] is morphologically very similar to *P. oryzae*

[ibid., 28, p. 246 and preceding abstract], but is almost certainly *P. setariae* [ibid., 27, p. 581]. Papaw mosaic [virus: ibid., 27, p. 483; 28, p. 246] was severe on two farms. Affected trees and seedlings were destroyed and no new cases appeared in the next few months.

Phytophthora infestans was again very destructive on potatoes in the Usambara Mountains [ibid., 27, p. 353]. A strain of the fungus collected at Lushoto was designated by Dr. Black of Edinburgh as strain E [ibid., 30, p. 385]. Of the varieties provided by Dr. Black for trial in Tanganyika only No. 1318 (3) appeared to be resistant to the new strain, but is susceptible to leaf roll. The presence of *Pseudomonas angulata* on tobacco was confirmed. Kromnek disease [tomato spotted wilt virus: ibid., 30, p. 79] took a mild form in the Iringa area, but affected all the tobacco farms there.

New host records for Tanganyika include *Leveillula taurica* [ibid., 30, p. 79] on balsam (cultivated varieties of *Impatiens*) [cf. ibid., 29, p. 154] and hollyhock, and *Alternaria ricini* on castor [*Ricinus communis*; cf. ibid., 29, p. 171].

Annual Administration Report of the Department of Agriculture, Uttar Pradesh, for the year ending 30th June, 1949.—125 pp., 1950.

This report [cf. *R.A.M.*, 29, p. 249; 30, p. 405] contains the following items of interest. In a study of the utility of fungicidal seed dressings for sugar-cane setts dry agrosan gave the best germination and hortosan (4 oz. per 10 gals. water) [ibid., 29, p. 230] showed promising results. Healthy planting material developed less yellowing than setts from canes affected by wilt [*Cephalosporium sacchari*: ibid., 29, p. 250]. Red rot [*Physalospora tucumanensis*: ibid., 29, p. 249] occurred in epidemic form in parts of Moradabad, Azamgarh, Banaras, and Jaunpur, India. Varietal resistance tests by the usual plug method showed that Co.S.351 and Co.S.361 at Shahjahanpur, Co.640 and Co.S.306 at Muzaffarnagar, and Co.S.348 at Gorakhpur are highly susceptible. Tested by the external infection method (red rot debris and spores with irrigation water), Co.S.245 and Co.S.320 were more resistant than Co.312 and Co.S.321 at Muzaffarnagar; Co.K.26 was the most resistant, and Co.S.311 the most susceptible variety at Shahjahanpur. An application of sulphur to the cane crop (20 lb. per acre) appeared markedly to increase resistance. The best control (with no adverse effect on the crop) was given by hot-water treatment of the setts (52° C. for 20 to 22 minutes).

Pigeon pea type 17W/2 was subjected to further tests of resistance to wilt [*Fusarium udum*: loc. cit.] and has now been selected for multiplication to replace type 66. Complete control of bajra (*Pennisetum typhoides*) smut [*Tolyposporium penicillariae*: loc. cit.] was given by the cold water and sunning treatment [ibid., 27, p. 18], but germination was reduced; with ceresan there was 0·7 per cent. infection, cold water and shade drying 0·9 per cent., agrosan G.N. 1·5 per cent., and untreated 2·8 per cent.

Some encouraging results have been obtained from the multiplied stock of 24 potato tubers (two each of 12 strains) of FX Up-to-Date (free from virus X) [cf. ibid., 28, pp. 115, 161, 412; 29, p. 250] obtained from Australia [ibid., 24, p. 334]. Roguing test crops reduced potato mosaic [? virus X] in one season from 20·9 to 2·4 per cent. In 1948 a considerable quantity of disease-free 'seed' was distributed to growers. Germination was 99 per cent. Roguing was carried out regularly and disease averaged only 1 to 2 per cent., much lower than in fields planted with ordinary 'seed', and the yield 275 (maximum 548) maunds per acre [1 maund = about 80 lb.], as against 150. Majestic potatoes sprayed three times at fortnightly intervals against early blight caused by a species of *Alternaria* apparently different from *A. solani* [ibid., 29, p. 250] with Bordeaux mixture (5-5-50), perenox (0·3 per cent.), dithane D-14, dithane D-78, and yellow cuprocide, and unsprayed developed 0·38, 1·5, 4·34, 1·46, 1·23, and 4·05 per cent. infection,

respectively. *Alternaria* spores have been detected in soil adhering to Majestic seed potatoes.

Incidence of *Phaseolus mungo* leaf spot, caused by a species of *Cercospora* [cf. ibid., 13, p. 11] appears to be greatly increasing and the damage caused is considerable.

Applications of sulphur dust to the wheat variety NP.125, susceptible to rust [*Puccinia* spp.], at intervals of 4, 7, and 10 days resulted in 2·8, 5·8, 8·4 per cent. infection, respectively, as against 19·9 per cent. in the untreated. The dusted plots gave very high yields per acre compared with untreated commercial plots with a much heavier rate of infection. High humidity occasioned by continuous rain induced the early appearance of yellow rust [*P. glumarum*], followed by brown rust [*P. triticina*], and then by black rust [*P. graminis*: ibid., 27, p. 358] on wheat in a complex experiment on the interaction of manures and irrigation. Field operations and sowing were three weeks later than usual and thus the susceptible physiological age of the plant synchronized with that of the parasite. The treatments elicited remarkable responses, intensity of infection varying with manures, irrigation, and mixed cropping.

Guava die-back and wilt [ibid., 28, p. 6; 29, p. 250] was widely prevalent; cultural and pathogenicity tests yielded species of *Fusarium*, *Pestalotia* [cf. ibid., 30, p. 185], and *Rhizoctonia*.

Hopkins (J. C. F.). **Summary of Annual Report of the Chief Botanist and Plant Pathologist for the year ended 31st December, 1949.**—*Rhod. agric. J.*, 47, 4, pp. 356–363, 1950.

In this report on plant disease work in Southern Rhodesia during 1949 [cf. *R.A.M.*, 29, p. 143] new records include root rot of sunn hemp [*Crotalaria juncea*] caused by *Thielaviopsis basicola* [cf. ibid., 6, p. 716]; a single record of charcoal rot (*Macrophomina phaseoli*) [cf. ibid., 17, p. 160] of Irish potatoes planted under hot dry conditions; maize cob rot (*Nigrospora oryzae*) [cf. ibid., 20, p. 449], which was severe on inbred varieties; cassava stem rot (*Botryodiplodia theobromae*) [cf. ibid., 28, p. 210], and avocado anthracnose (*Glomerella cingulata*) [loc. cit.]. *T. basicola* is of particular importance inasmuch as it causes tobacco black root rot, which has not been reported from the Colony. *N. oryzae* has not before been of any consequence on established open-pollinated varieties. A disease simulating severe leaf curl in tobacco (vein-thickening) was found in a single plant.

Tobacco leaf sent to auction developed a large amount of barn-spotting frog eye (*Cercospora nicotianae*) [ibid., 29, p. 144]. Rosette [tobacco vein distorting and mottle viruses: ibid., 28, p. 209] was widely distributed in late plantings and reports of heavy losses were received. Warnings had been issued earlier and some growers who sprayed their late plantings with a residual aphicide had good results. Instances of recovery were observed very late in the season; this is contrary to experience, and no explanation has been advanced. *Pythium aphanidermatum* [ibid., 18, p. 785] again caused severe damping-off in seed-beds and foot rot in transplants during hot, dry weather. Seed known to be infected by *Pseudomonas tabacum* [ibid., 28, p. 209] was treated with silver nitrate, crushed, and kept in sterile nutrient broth for over a week without the development of bacteria or fungi; treated seed germinated normally.

A foot rot of young maize during hot, dry weather following rains was caused by *Fusarium moniliforme* [*Gibberella fujikuroi*] var. *subglutinans* [cf. ibid., 15, p. 558], which killed the tap root before the adventitious roots had developed sufficiently to support the young plants. A few days after rains had fallen, side roots were put out and the remaining young plants grew normally.

Cauliflower whiptail due to molybdenum deficiency [cf. ibid., 29, pp. 5, 407; 30, p. 8], not previously reported, was noted twice. The young leaves of affected plants

treated with a solution of ammonium molybdate (1 lb. per acre) made normal growth after three weeks, whereas untreated ones remained distorted. No improvement took place in the development of the curd, probably because of the advanced age of the plants when treated.

Cotton with very severe leaf spot due to *Alternaria gossypina* was received from Portuguese East Africa; such severe infection has not been recorded in Southern Rhodesia [ibid., 17, p. 674].

Sugar-cane smut (*Ustilago scitaminea*) [ibid., 28, pp. 196, 210] developed in the following newly introduced lines exposed to field infection: Co. varieties 313, 453, and 464; N. Co. varieties 79, 151, 291, 292, 313, 323, 330, 349, and 351; and M. 270 [cf. ibid., 28, p. 55; 29, p. 477]. Co. 453 and 464 developed most smut whips.

Rapport annuel pour l'exercice 1949. [Annual report for the year 1949.]—*Publ. Inst. nat. Étude agron. Congo belge 1950* (hors sér.), 306 pp., 1950.

The following items occur in the sections of this report (pp. 68–87, 100, 101) dealing with phytopathological work in the Belgian Congo [cf. *R.A.M.*, 29, p. 292]. The susceptibility of *Albizzia moluccana* to *Armillaria* [*mellea*] renders this tree unsuitable for use as shade in coffee plantations. A bacterial rot [unspecified] of the Kernel reduced the percentage germination of a few lots of oil palm seed; seed treatment with organo-mercury compounds is suggested.

Studies were continued on the control of root rot of *Hevea* rubber (*Rigidoporus microporus*) [*Fomes lignosus*: ibid., 29, p. 99; 30, pp. 286, 387]; burning reduced the surface macrofungi to a few species of pore-bearing Basidiomycetes, though in the non-incinerated plots Basidiomycetes and Ascomycetes were abundant. Ringing the trees four to six months before felling and poisoning the stumps with sodium arsenite [loc. cit.] gave promising but irregular results and this method appears of doubtful value. Curative and preventive treatments with copper sulphate, fuel oil, tar, and a mixture of motor oil and petrol are being tested. It is necessary to maintain three annual operations (after the sixth year from planting) against *F. lignosus*, if *A.* [*mellea*] is present. Laboratory studies confirmed the weakly stimulating effect of light on mycelial growth of *F. lignosus* [ibid., 29, p. 293]. The dry weight of mycelium increased progressively with increase in pH of the medium, optimum growth not being reached, apparently, even at pH 7·75. On the other hand, in nature virulence increases in acid conditions. This apparent anomaly may perhaps be explained by the fact that the virulence displayed by *F. lignosus* towards its habitual hosts is independent of its saprophytic development. Control measures based on modification of the soil pH are therefore likely to be unreliable. Bacteria isolated from the rhizosphere of *Palisota* sp. and *Commelina* sp. retarded mycelial development of *F. lignosus* on potato dextrose agar.

Further observations have invalidated the view that the virulence of *F. lignosus* to *Hevea* rubber reaches a definite peak when the plants are six years old. *A. mellea* accounted for 38·5 to 65·6 per cent. of the root rot present in plantations six to eight years old; it is apparent that this fungus can attack rubber trees when they are very young and can become highly virulent [ibid., 26, p. 466].

Further evidence confirmed the good resistance shown by clones M.8, BD.5, and Av.49 to brown bast [ibid., 12, p. 80; 29, p. 170].

An oil palm plantation of 12 ha. was laid down to study cultural methods for the control of *A. mellea* [ibid., 30, p. 155]. As soon as a suitable inoculation method has been devised the young trees are to be tested for resistance. Symptoms develop more rapidly on seedlings than on adult palms. Application of lime or magnesian lime at the rate of 5 kg. per tree per annum almost completely suppressed internal infection and fatal cases and greatly reduced superficial infection. Acid phosphorus at 400 gm. per tree favoured infection. When lime and phosphorus were used together the effectiveness of the lime was reduced and infection increased. At

pH 5, optimal for rhizomorph development, the growth of *A. mellea* in darkness is ten times as rapid as in light. *A. mellea* differs from *F. lignosus* in that the conditions of virulence and optimal growth coincide and cover a rather narrow range. Raising the soil pH artificially is therefore effective against *A. mellea*. Preliminary experiments established that an undetermined sterile mycelium isolated from the rhizosphere of *Palisota* sp. exerted an inhibiting effect on the development of *A. mellea* rhizomorphs.

Cotton wilt (*Fusarium vasinfectum*) [ibid., 24, p. 414; 27, p. 122], observed in 1942 in the region of Mwene-Ditu, appeared near Kaseke, where it caused losses of varying importance. The best method of control will be to replace the Triumph variety by Gar 105, which is highly resistant [see below, p. 519]. Macroscopic detection of the disease is possible only with fresh, growing material; certain symptoms, such as the brown streaks under the skin and in the wood, observed at the end of the growth period do not necessarily indicate the presence of *F. vasinfectum*.

Memoria de la cuarta reunión de Trigo, Avena, Cebada y Centeno. 31 de Mayo y 1 de Junio de 1950 en la Estación Experimental Pergamino. [Report of the fourth Wheat, Oats, Barley, and Rye conference 31st May and 1st June, 1950, at the Pergamino Experiment Station.]—259 pp., 11 figs., 3 diags., 10 graphs, República Argentina, Ministerio de Agricultura y Ganadería de la Nación, 1950. [Mimeographed.]

Most of the papers in this report are concerned with the breeding of cereals for resistance to pests and diseases in Argentina [cf. *R.A.M.*, 27, p. 67].

E. J. Martinez (pp. 9–14) describes a method for the recognition and assessment of infection involving three inspections, and gives notes on the incidence of *Puccinia glumarum*, *P. triticina*, and *P. graminis* on wheat in 1949 [cf. ibid., 28, p. 57].

E. F. Godoy, H. J. Savoia, and O. Bruni (pp. 16–19) found that infection of wheat by *P. graminis* was generally mild in 1949, but outbreaks of intense severity occurred in 24 out of 196 stands (12·3 per cent.) inspected in four of the six subregions of the cereal belt, the Benvenuto Inca variety being particularly susceptible. The physiologic races identified were 11, 15, and 17 [cf. ibid., 28, p. 58].

The same authors (pp. 21–30) found that physiologic races 49, 20, and 15 of *P. triticina* [ibid., 30, p. 148] were the most prevalent on wheat (in the order given), race 15 only being found on the variety Klein Orgullo.

J. Vallega and E. Favret (pp. 32–33) have found of recent years that race 17 of *P. graminis* is the most widespread on wheat throughout the cereal belt, the highly aggressive 15 being largely confined to the northern subregions, while the appearance of 42 and 11 is sporadic and 14 has been observed only in the Andean-Patagonian valleys [loc. cit.]. Most of the commercial varieties are susceptible to races 15 and 17, the exceptions including Reliance-Aniversario (containing the Kanred factor) and certain strains originating in Kenya and Egypt.

Group 20 (comprising races 20, 13, 31, and 49) of *P. triticina*, from which Sinvalocho is immune, is still the most prevalent, though the relative predominance of 15 (15, 154, 62, and a new race R.n.) increased considerably during 1947 and 1948. Group 114 (114, 77, and 105) is sufficiently common to be taken into account in phytotechnical programmes, while the other two groups, 5 and 57, each represented by only one race, are very seldom in evidence. Race R.n. is very similar to 15 except in its pathogenicity to Carina wheat and some barley varieties. Race 15 has been divided into two subraces, 15L and 15, pathogenic and non-pathogenic, respectively, to Klein Lucero. Resistance to races 20, 15, and 114 has been shown by Timstein, to 20 and 114 by Bobin Gaza Bobin, and to 20 and 15 by (Mediterranean—Hope × Kawvale—Tenmarq) and Thatcher × (La Estanzuela × Rafaela 6). Wheats of Brazilian origin fall into three groups in respect of reaction to *P. triticina*,

viz., (1) comprising Bage, Pitest, and Frocor, resistant to groups 20, 5, and 114; (2) including Frontana, Fronteira, Negroz, and Rio Negro, resistant to groups 15 and 114 and susceptible to 20; and (3) represented by P.G.-1 Centena Nordeste and Riosulino, which are susceptible to the three groups mentioned. Frontana is also resistant to race 15 of *P. graminis*.

At least two races of *P. glumarum*, 30 and 37 [loc. cit.], are present in Argentina, and the sole source of resistance resides in Chino 166 and its descendants.

E. J. Martinez (p. 34) summarizes the data from experimental plots laid down at Castelar in 1948 and 1949 to determine the crop reductions from crown rust of oats (*P. coronata*) [ibid., 29, p. 353] on the Richland variety and from *P. triticina* and *P. glumarum* on several wheat varieties. Prophylactic treatments at five-day intervals with sulphur dust [loc. cit.] at a dosage of 60 kg. and lime-sulphur at 10,000 to 20,000 l. per ha. resulted in the virtual elimination of infection, while in the untreated it was estimated that for every 10 per cent. increase in the incidence of *P. coronata* the yield of oats fell by 84 kg. per ha., the corresponding amount for Alto de Sierra wheat through the joint action of *P. glumarum* (75 per cent.) and *P. triticina* (25) being 96 kg., and for 38 M.A. and Klein 157, due to *P. triticina*, 84 kg. per ha. In round figures, a drop of 4 to 5 per cent. in the harvest may be reckoned for every 10 per cent. increase in the incidence of *P. coronata* on oats and *P. triticina* on wheat.

Since 1945 J. A. Sarasola and M[aria] D. Campi [de Sarasola] (pp. 35–36) have been investigating the reactions of commercial wheat varieties to two destructive pathogens, *Septoria nodorum* and *S. tritici* [ibid., 29, p. 352], and seeking sources of resistance for use in the breeding programme. Lin Calel M.A., Klein 157, and Cheg 89 × 5152 are highly resistant to *S. nodorum* and a number of other varieties, including several types of Buck and Klein and Superhard Blackhull, moderately so, but susceptibility to *S. tritici* appears to be general. The best sources of resistance to *S. nodorum* have been found to lie in the varieties Baldrock, Biskri a/c 2, Bonaerense, Dawson's Golden Chaff, Elgin, Gasta, Gipsy, Harvest Queen, Honor, Imperial Amber, Klein H157L2. 300,000, Kruse C.I. 11524, Lin Calel, Marquillo—Oro × [*Triticum*] *timopheevi*, Mediterranean × Hope × Kawvale × Tenmarq D.T.V. 181, Minhardi D.I.V. 1459, No. 8360 Georgia, Purplestraw, Redhart, Redhart Strain 5, and Red May.

The same two pathogens have been studied in relation to varietal reactions by O. Bruni, E. F. Godoy, and H. J. Savoia (pp. 37–49). *S. nodorum*, of greater economic importance than *S. tritici*, was responsible for heavy losses in the wet springs of 1939 and 1944. *S. tritici*, favoured by humid winter and damp, cold spring weather, attained wide diffusion and great severity in 1943. In the breeding programme development for resistance to *S. nodorum* should rank second only to the production of a comparable reaction to *P. graminis*. Tables are given showing the responses of a number of Argentine and foreign varieties to natural infection by *S. nodorum* and *S. tritici* from 1943 to 1950, inclusive, and to inoculation by the former species in 1949 and 1950.

H. Cenoz (p. 50) reports on a search for sources of resistance to wheat loose smut (*Ustilago tritici*) and bunt (*Tilletia* spp.) [*T. caries* and *T. foetida*]. Some of the varieties showing resistance to loose smut in inoculation tests have already been enumerated [loc. cit.]. Mention is here made also of Massaux 1 and 5 among the indigenous wheats and of Egypt N.A. 101, Normandie, Hope, and Marquis among the foreign. The native varieties most resistant to bunt were Klein Pirámido, Kanhard sel. Buck, and Klein Orgullo [loc. cit.], while moderate resistance was displayed by Buck Claromecó, Kanred, Klein Aniversario, Klein Cometa, and Reliance. Among the resistant foreign varieties were Oro, Hussar, Martin, Warigo, Biancuccia, Mekki, and Taganrock.

F. E. Haub (pp. 51–53) presents figures relating to the proportion of the wheat

crop infected by bunt from 1939–40 to 1949–50, inclusive. A peak was reached in 1948–49 with the contamination of 259,734 out of a total of 4,020,611 tons (6·46 per cent.), the corresponding figures for 1949–50 being 186,885 out of 3,305,762 tons (5·65 per cent.), representing a financial loss of $1,300,000.

C. J. M. Carrera (p. 51), in a preliminary statement on the objects and scope of an intensive study newly undertaken on various aspects of the fusariosis of cereals due to *Gibberella saubinetii* [*G. zeae*], gives the optimum pH for the development of the pathogen in pure culture as 6 and the minimum, optimum, and maximum temperatures as 4°, 24°, and 33° to 34° C., respectively [cf. ibid., 28, p. 58].

J. L. Tessi (p. 199) has demonstrated the existence of two races of *Pseudomonas coronafaciens* attacking oats in Argentina [ibid., 29, p. 353]. The varieties Klein Mar, La Estanzuela F2 au 12, and D.L.M. 3 are resistant, and Quincy Red C.I. 4077, Letoria C.I. 3392, and La Previsión 13 semi-resistant to race 1, while La Estanzuela F2 au 12 and D.L.M. 3 are susceptible to race 2.

The same author (p. 200) adds to the list of barley varieties resistant to *Xanthomonas translucens* var. *cerealis* [loc. cit.] Brugh 23, Sel. Mo. Early Beardless 405, and York Hooded.

A. D. Villar (pp. 209–210) includes reactions to some important fungal diseases among the characters of the forage barleys to be used in a breeding programme at the Oliveros Experiment Station. Trebi Sel. Klein and Primor × Trebi FCS are immune from *Rhynchosporium secalis* [ibid., 30, p. 462]; Utah Winter Club, Nobard, and Multan × Glabron 4884 show some resistance in the field to *Helminthosporium teres* [ibid., 29, p. 353]; Monte Cristo C.I. 1017 and Engledow India are immune from the Argentine races of *Erysiphe graminis hordei* [loc. cit.], Multan × Glabron is highly resistant, and Arlington Awnless C.I. 702 resistant, while Anoidium 35·3 is immune from Argentine race 1. In addition to these contributions, a number of others refer incidentally to matters of phytopathological interest.

Registro epifitológico organizado por la División de Inmunología Vegetal del Instituto de Fitotecnía y consideraciones sobre los ataques de roya observados en los Trigales en 1949. [Epiphytological chart devised by the Division of Plant Immunology of the Phytotechnical Institute and considerations on rust attacks on Wheat in 1949.]—Reprinted from *Inf. Direcc. Invest. agríc., B. Aires*, 35–36, 7 pp., 3 maps, 1950.

Details are given of the chart drawn up in 1948 at the Phytotechnical Institute, Buenos Aires, for recording epiphytotics of the principal diseases affecting cereals [see preceding abstract] and flax in Argentina [*R.A.M.*, 30, p. 319].

Oelofsen (O. N.). **Investigation of cereal diseases in the Western Cape Province.**—*Sci. Bull. Dep. Agric. S. Afr.* 289, 17 pp., 1 pl., 3 diags., 1947 [issued 1950].

In studies at the Stellenbosch-Elsenburg College of Agriculture on the fungus flora of wheat samples from the Western Cape Province, South Africa, with reference to the possible spread of *Ophiobolus graminis* and *Fusarium* spp. causing foot and root rot of wheat [*R.A.M.*, 30, pp. 145, 223], fungi belonging to 16 different genera were isolated from the surface of unsterilized grain. For removing spores from the grain surface the use of an apparatus, consisting of a horizontal, movable platform agitated by a 1/30 h.p. electric motor, by means of which ten grains from each sample were shaken for five minutes in 10 ml. sterile water, proved more effective than the washing method [ibid., 16, p. 28]. One ml. of the wash was transferred to melted potato dextrose agar and incubated for 72 hours at 25° C. Of the 2,069 cultures isolated by this method only two, tentatively identified as *Macrosporium* sp. or *Alternaria* sp., were pathogenic to Sterling wheat.

Most methods of surface sterilization proved ineffective, but good results were obtained by soaking the grain in water, opening up the suture, and treating with

mercuric chloride. Following this method the fungi obtained from the internal tissues were *Macrosporium* sp. (16·8 per cent.), *Alternaria* sp. (11·2), *Pleospora* sp. (10·1), and *Helminthosporium* sp. (1·8). The remaining 60 per cent. could not be identified owing to lack of spore development. Only one isolate was weakly pathogenic to wheat.

It is concluded that wheat seed is of minor importance in spreading foot and root rot diseases in this crop and that seed disinfection will scarcely affect their occurrence.

Machacek (J. E.). **Results from co-operative seed treatment experiments on small grains.**—*Plant Dis. Reptr*, 35, 3, pp. 146–148, 1951. [Multilithed.]

During 1950, 40 cereal and flax seed treatments were compared in 59 uniform tests at 15 stations in Canada and seven in the United States [cf. *R.A.M.*, 28, p. 172; 30, pp. 146, 223]. Good control of artificial infections of *Tilletia caries* and *T. foetida* on Red Bobs wheat, of *Ustilago avenae* and *U. kolleri* on Vanguard oats, and natural infections of *U. hordei* and *U. nigra* on Plush barley was given by ceresan M dust and slurry [ibid., 29, p. 95] (at ½ oz. and ¼ to ¾ oz. per bush., respectively), mercuran AS (1 oz.), aagrano 48 and 250 [cf. ibid., 30, p. 28] (2 oz. and ¾ oz., respectively), agrox C, panogen [ibid., 30, p. 407], and other materials. All the treatments improved the germination of Regent wheat grain infected with *Helminthosporium sativum*, but none gave much increase in the germination of flax seed, of which 50 per cent. had been fractured during threshing.

Kotrba (L.). **Metoda ke stanovení biologické účinnosti mořidel proti sněti mazlavé (Tilletia tritici).** [A method of determining the biological effectiveness of treatments against bunt (*Tilletia tritici*).]—*Ochr. Rost.*, 23, 4, pp. 340–347, 3 figs., 1950. [Russian and English summaries.]

A description is given of a laboratory method developed in Czechoslovakia for testing the efficacy of fungicides against wheat bunt (*Tilletia tritici*) [*T. caries*: *R.A.M.*, 17, p. 501]. The materials to be tested (0·2, 0·5, 1, and 5 mg.) were placed in Petri dishes, 5 ml. spore suspension added, and the dishes kept in a refrigerator at 10° C. for six days. The following materials prevented germination at 0·2 mg.: germisan, ceresan, zyma 3, dow, tritisan, and agrosan GN; agronal allowed occasional germination. The fungicides also gave 90 to 100 per cent. control in field tests.

Pichler (F.). **Weizensteinbrandbekämpfung ein Problem!** [Wheat bunt control a problem!]—*Pflanzenarzt, Wien*, 3, 9, pp. 3–4, 1950.

Notwithstanding the fairly general application of seed treatment for wheat bunt [*Tilletia caries*] control in Austria, the disease is definitely on the increase, and particularly since the end of the second world war it has assumed a destructive form, notably in Upper Austria [*R.A.M.*, 28, p. 377]. Similar observations have been made elsewhere, e.g., in Bavaria [cf. ibid., 30, p. 30]. Laboratory experiments in the elimination of infection by seed treatment with standard fungicides have proved completely successful, so that some other factor or factors must be responsible for the failure of this method of control in the field.

To determine the possible influence of local ecology on the results of the treatment, comparable experimental plots were laid down in (*a*) Upper and (*b*) Lower Austria, the former region having been devastated by bunt in the previous year. Five winter varieties were used, namely, the fairly resistant Austro Bankut, the highly susceptible Firlbeck and Ritzlhofer, and the moderately susceptible Tassilo and Walthari. The seed was heavily inoculated (5 gm. bunt powder per kg.). The incidence of infection in the untreated rows of these varieties (in the order named) was as follows: (*a*) Upper Austria 7·1, 40·1, 49·7, 29, and 13·5; (*b*) Lower Austria 10·2, 67·1, 66·7, 36·8, and 14·7. In those treated the maximum percentage of 1·6 occurred in Ritzlhofer, the resistant Austro Bankut remained almost free

from bunt, and in all the other samples the incidence was less than 1 per cent. except in Firlbeck (1·1 per cent.).

The risk of seed infection through contact with contaminated stable manure was shown experimentally several years ago to be remote, and as a general rule there can be no objection to the use of smutted bran, etc., as fodder. The writer recommends the use of all dusts in liquid form at the uniform rate of 200 gm. per 100 kg. seed, the proportions of water necessary for the sprinkling, short liquid, and immersion processes being 10, 3, and 100 l., respectively.

Polyakov (I. M.). Химический метод борьбы с пыльной головней Пшеницы при помощи родана. [A chemical method for the control of loose smut of Wheat with rodan.]—*Rep. Lenin Acad. agric. Sci.*, 15, 9, pp. 27–35, 1 graph, 1950.

The results of experiments carried out in various parts of the Soviet Union with the new fungicide rodan [the chemical composition of which is not given] for the control of wheat loose smut [*Ustilago tritici*: *R.A.M.*, 27, p. 13] are stated to show that the treatment was mostly as effective as hot water and in some cases better. The results also demonstrated that smut infection is much less in plants derived from seeds grown during a dry year. While untreated Tzezium in 1946 had 10·4 per cent. infection, in 1947 it had only 1·97.

Holton (C. S.). **Methods and results of studies on heterothallism and hybridization in Tilletia caries and T. foetida.**—*Phytopathology*, 41, 6, pp. 511–521, 1951.

The following method was developed at the Washington Agricultural Experiment Station for the isolation and culture of complete sets of primary sporidia from individual promycelia of the causal organisms of wheat bunt, *Tilletia caries* and *T. foetida* [*R.A.M.*, 30, p. 364]. A small section of water agar bearing germinating chlamydospores in a Petri dish was transferred to a cover-slip adjacent to a similar section of potato dextrose agar. The cover-slip was inverted on a Van Tieghem cell, and by means of a Chambers micromanipulator passing through the wall of the cell a complete set of primary sporidia could be picked from a promycelium and rapidly transferred to the potato dextrose agar. After further culture transfers were made into test-tubes of potato dextrose agar. The method used for the inoculation of Hindi wheat seedlings with paired monosporidial lines was a modification of one previously described [ibid., 17, p. 804], involving the substitution of glass vials for Petri dishes and wet sand for filter paper. Prevention of desiccation of the primary sporidia in the isolation process was the critical factor in the viability of monosporidial lines, injury from mechanical transfer being negligible.

Larger percentages of the isolated primary sporidia of *T. caries* grew than of *T. foetida*, the averages for 15 physiologic races of the former and four of the latter being 58·5 and 46·6, respectively. Similarly, the isolated primary sporidia of some races of each species grew more readily than those of others, indicating a genetic difference between them.

Two sex-compatibility factors were found in matings between monosporidial lines from individual chlamydospores. No evidence of multiple factors for sex was forthcoming in matings between monosporidial lines from different chlamydospores.

A sex-linked lethal deficiency in one race of *T. foetida* (L-8) was indicated in studies with monosporidial lines, viable lines being produced by only about half the sporidia in each of at least 25 sets of primary sporidia.

Segregation and recombination of factors for reticulate and smooth spores occurred in the F_2 population of a hybrid between *T. caries* and *T. foetida* (T-12 × L-8). There was also some inconclusive evidence of segregation and recombination of factors for chlamydospore germination rate.

Vallega (J.). **Características de la raza fisiológica 45 de 'Puccinia coronata avenae' aislada en la Argentina.** [Characteristics of physiologic race 45 of *Puccinia coronata avenae* isolated in Argentina.]—*Rev. Invest. agríc., B. Aires*, 4, 3, pp. 337–339, 1951.

The Argentine physiologic race 45 of *Puccinia coronata* [see above, p. 514] having been found capable of attacking varieties such as Mutica Ukraina C.I. 3259, Santa Fé No. 1 C.I. 4518 [*R.A.M.*, 29, p. 353], Landhafer C.I. 3422, and Trispernia C.I. 4009, which are resistant to its North American homonym, the two races are evidently distinct pathogenic entities. Up to the present the only varieties that have shown resistance to the Argentine race 45 are some of those carrying the 'Victoria factor' for susceptibility to *Helminthosporium victoriae* [ibid., 26, p. 99 *et passim*]. Race 45 has been collected annually from 1939 to 1950 in the Argentine cereal belt and occasionally in other parts of the country, as well as on material imported from Uruguay and Brazil, though generally in negligible proportions compared with the widespread race 1.

Tullis (E. C.). **Fusarium moniliforme, the cause of a stalk rot of Sorghum in Texas.**—*Phytopathology*, 41, 6, pp. 529–535, 1 fig., 1951.

A stalk rot of sorghum in north-western Texas, with many symptoms reminiscent of charcoal rot (*Macrophomina phaseoli*), was found to be caused by *Fusarium moniliforme* [*Gibberella fujikuroi*: *R.A.M.*, 21, p. 161; 29, p. 411]. The most conspicuous features of the disease were a red to purple or brown discoloration of the pith and vascular bundles in the interior of the culm, followed in the later stages by watersoaking or rotting away of the pith, leaving loose vascular strands inside the outer cylinder of the culm, a condition usually termed 'shredding'.

Inoculation experiments through wounds resulted in stalk rot development in all the varieties tested, some of which, moreover, e.g., Texas milo, contracted infection without previous injury when sown in soil contaminated by the pathogen. Resistance to *G. fujikuroi* was shown by Texas Blackhull kafir, feterita (F.C. 811), Extra Early Sumac, and, in general, by varieties resistant to charcoal rot. Ingress to the culm is gained through wounds, and in highly susceptible varieties, such as Sooner and Texas milo, through the roots at or near soil-level. The pathway of invasion is through the vascular bundles and later through the pith.

Dickson (R. C.), Flock (R. A.), & Johnson (M. McD.). **Insect transmission of Citrus quick-decline virus.**—*J. econ. Ent.*, 44, 2, pp. 172–176, 1951.

The citrus quick decline virus [*R.A.M.*, 30, p. 465] has been transmitted at the University of California Citrus Experiment Station, Riverside, by *Aphis gossypii*. Compared with *A. citricidus*, tested by Bennett and Costa in Brazil [ibid., 30, p. 413], *A. gossypii* is a rather inefficient vector, accomplishing only two transmissions in the first 20 tests involving some 3,200 aphids. Surveys of the aphids breeding on citrus in California in 1950 revealed high populations of *A. gossypii* in certain southern areas where quick decline has spread rapidly, and generally low infestations where dissemination has been slow. Possibly the efficiency of the aphid as a vector is decreased by the fact that it is attracted to many plants besides citrus. None of the other 311 species of insects used in the trials acted as carriers, with the possible exception of certain membracids, about which the evidence is inconclusive. [An account of this work also appears in *Calif. Agric.*, 5, 4, pp. 5, 12, 2 figs., 1951.]

Venkatram (C. S.). **Seed-borne fungi and loss of Cotton seed viability.**—*J. Madras Univ.*, 19, pp. 79–112, 9 graphs, 1950. [Received May, 1951.]

Studies were made in the University Botany Laboratory, Madras, on the influence of storage conditions on the loss of viability in seed of three varieties of

cotton, Guntur 1 and Karunganni 1 of *Gossypium arboreum* and Hagari 1 of *G. herbaceum*, and the role of micro-organisms in seed deterioration in storage [*R.A.M.*, 28, p. 476]. Temperatures of 28° to 30° C. were optimum for storage of delinted seeds with a moisture content of 6 per cent., since the fungi infecting the seeds lost their viability before the seeds themselves. Sealed containers were essential. Examination of seed of 11 varieties from 13 sources showed that fungi are not the primary cause of seed deterioration in storage, nor did the cotton wilt pathogen, *Fusarium vasinfectum* [see next abstract], appear to be seed-borne. The internal microflora of the seeds consisted mainly of common saprophytes. *Aspergillus ustus* [ibid., 28, p. 24], two strains of *Rhizopus nodosus* [ibid., 16, p. 773], and *Macrophomina phaseoli* were isolated from the interior of cotton seeds for the first time. The two last-named reduced germination and attacked young seedlings. Of the species isolated from the exterior of seeds *Fusarium* spp. were the most important pathogens.

Twenty-seventh Annual Report of the Indian Central Cotton Committee for the year ended 31st August, 1948.—121 pp., 10 pl., 1 map, [? 1948. Received 1950.] Rs 2.

This report contains some references to various schemes for the improvement of cotton in India, including the development of resistance to wilt [*Fusarium vasinfectum*: see preceding abstract] by selection or hybridization [see above, p. 513]. Material of the cross $\{(8{\cdot}1 \times \text{K.F.}) \times 8{\cdot}1\} \times 8{\cdot}1$ F_5 was found to be completely resistant to the disease in the field. A high degree of resistance, combined with high ginning percentage and good staple length and 'feel', was also shown by (1027 A.L.F. × B.C. 1·6) F 9. Eleven lines derived from a progeny of Gaorani 16C(II-41-6838) proved to be fully resistant to wilt at Poona under optimum conditions of infection, temperature, and humidity; two are also satisfactory in respect of fibre characters and ginning outturn.

Thiers (H. D.) & Blank (L. M.). **A histological study of bacterial blight of Cotton.** —*Phytopathology*, 41, 6, pp. 499–510, 2 figs., 1951.

The histological examination at the Texas Agricultural Experiment Station of the infected tissues of the cotton varieties Acala, D & PL, Coker 100 Wilt, Stoneville 2B, and undetermined commercial varieties susceptible to bacterial blight [blackarm; *Xanthomonas malvacearum*: *R.A.M.*, 28, p. 573] and the resistant Stoneville 20 revealed no essential differences between them in the development of the disease except as regards the number of bacteria and extent of the lesions. There was no sign of any morphological barrier to account for the limited progress of infection in resistant plants. Resistance is accordingly attributed, in agreement with Simpson and Weindling's observations, to a physiological incompatibility between host and parasite [ibid., 25, p. 448]. Tissue destruction was nearly always confined to the parenchyma, seldom extending to the vessels. Cellular disorganization, as already suggested by Massey [ibid., 8, p. 568], appears to be effected by enzymatic action.

Alvim (P. De T.). **Deficiências minerais em Sisal e a 'necrose da base das folhas'.** [Mineral deficiencies in Sisal and the 'leaf base necrosis'.]—*Ceres*, 8, 46, pp. 222–232, 6 figs., 1950. [English summary.]

The so-called 'leaf base' disease or 'banding' disease of sisal, the most important trouble affecting the crop in Brazil, has been attributed to potassium deficiency [*R.A.M.*, 24, p. 508]. However, in the author's experiments, covering a period of 18 months, every field symptom of the disease developed in nutrient culture solutions only in the absence of magnesium. The disorder is accordingly attributed

to magnesium deficiency, and reports of its control by potassium soil amendments may be explained either by the presence of magnesium as an impurity in the fertilizer or by the base exchange between the two elements in the soil.

Das Gupta (N. N.), De (M. L.), & Raychaudhuri (S. P.). **Structure of Sannhemp (Crotalaria juncea Linn.) mosaic virus with the electron microscope.**—*Nature, Lond.*, 168, 4264, p. 114, 1 fig., 1951.

Electron micrographs made at the Institute of Nuclear Physics, Calcutta, of a crystalline preparation of sann hemp mosaic virus [*R.A.M.*, 26, p. 300; 28, p. 161] indicated that it consists of spherical particles, the diameter of which varies from 26 to 40 mμ.

Batista (A. C.) & Da Silva (J. N.). **Uma nova doença da Roseira, causada por Stagonospora rosarum n.sp.** [A new Rose disease caused by *Stagonospora rosarum* n.sp.]—*Bol. Agric., Pernambuco*, 17, 3–4, pp. 220–223, 5 figs., 1950. [English summary.]

A description is given of a hitherto undescribed blight of rose buds at Recife, Brazil, caused by *Stagonospora rosarum* n.sp., which develops in the rainy season and culminates in the mummification of the buds. From the onset the affected buds appear to be abnormally tightly furled and of a firm consistency. Later, when the healthy buds open, the infected ones remain half-crumpled, with the sepals detached and the straw- or cream-coloured outer petals adhering to one another. Microscopic examination reveals on the petals indefinite, amphigenous lesions bearing numerous black dots which represent the fructifications of the fungus. The peduncles shrivel, but the stems and leaves usually escape infection. The disease is spread by contact between the infected organs and healthy buds, while rain and wind disseminate the conidia extruded from the pycnidia. Preventive sprays with copper-containing fungicides, e.g., cuprocide, cuprocide 54Y, or cure-damp at 0·5 per cent. and 1 per cent. Bordeaux mixture with Du Pont's spreader (15 ml. per 100 l.) should be applied at ten-day intervals from the inception of bud emission.

The pycnidia of *S. rosarum* are innate, then erumpent, membranaceous, brown, globose or papillate, 197 to 320 μ in diameter, furnished with several circular ostioles, 22·8 to 30 μ in diameter, and the conidia are hyaline, uni- to quadriseptate, uni- to triguttulate, straight or slightly curved, clavate to fusoid, 17 to 23 by 3·8 to 5·7 μ, with rounded ends, borne on simple, hyaline conidiophores, 11 to 15·2 by 1·2 to 1·9 μ.

Smolák (J.) & Novák (J. B.). **Virové choroby Šeříku.** [Virus diseases of Lilac.]—*Ochr. Rost.*, 23, 4, pp. 285–304, 10 pl., 3 figs., 1950. [Russian and English summaries.]

In the course of nine years 60 lilac bushes growing in the gardens of the Fruit and Horticultural School, Ruzyň, Czechoslovakia, have succumbed to a disease, apparently of virus nature [*R.A.M.*, 19, pp. 303, 410]. The remaining 36 bushes are wilting and dying off. The variety Casimir Perrier was killed most rapidly. From a study of diseased material from this locality and other sources the authors divide the lilac virus diseases symptomatologically into three groups: (I) mosaics, including ring spots and yellows which may be accompanied by distortion; (II) leaf deformations, such as rolling, curling, rosettes, asymmetry, narrowing, and leathery texture; and (III) leaf destructions of the necrosis type, among the most striking of which is holing, often in circular patterns [cf. ibid., 30, p. 13]. Detailed descriptions are given of the various symptoms.

Kišpatić (J.). **Pjegavost Cinije (Alternaria zinniae Pape).** [Spotting of Zinnia (*Alternaria zinniae* Pape).]—*Glasn. hrv. prirodosl.*, Ser. II/B (*1948–1949*), 2-3, pp. 29–38, 1950. [English summary.]

Alternaria zinniae [*R.A.M.*, 21, p. 492; 22, p. 389; 28, p. 160] is widespread and destructive on *Zinnia* in Yugoslavia. The optimum temperature for growth of the fungus and sporulation on malt agar and malt-peptone agar is about 25° C. [cf. ibid., 22, p. 390], for the germination of the conidia between 20° and 24°, and for the spread of the disease on young plants 22° to 26°. The pathogenicity of the fungus has been confirmed. The percentage of young plants killed in heavy soil is much higher than in a light one.

Dusting the seed with various mercury fungicides gave satisfactory, though not complete control, germisan and ceretan [ceresan] (2 to 3 gm. per kg. seed) being the most effective. Better control was obtained by seed immersion, but this decreased germination. A 30-minute immersion in 0·1 per cent. ceresan gave complete control with 64·2 per cent. germination. In the field the disease can be controlled by two or three sprays with 1 per cent. Bordeaux mixture.

Black (L. M.). **Hereditary variation in the reaction of Sweet Clover to the wound-tumour virus.**—*Amer. J. Bot.*, 38, 4, pp. 256–267, 5 pl., 1951.

Leafhopper (*Agallia constricta*) inoculation studies at Brooklyn Botanic Garden, New York, showed that hereditary factors influenced the size, distribution, and morphology of the tumours induced on the roots and stems of sweet clover plants (*Melilotus alba* and *M. officinalis*) by the wound tumour virus [clover big vein virus: *R.A.M.*, 24, p. 511; 29, p. 215]. The hereditary influences on the roots were independent of those on the stem, and it is postulated that many genes are involved. A susceptible root was not rendered resistant by growing it on a top from a clone having a resistant root, and vice versa. The chief factors causing the reaction appear to be cellular, not hormonal. Clones of sweet clover with selected tumour responses are being propagated vegetatively.

Kreitlow (K. W.). **Infection studies with dried grain inoculum of Sclerotinia trifoliorum.**—*Phytopathology*, 41, 6, pp. 553–558, 1951.

Of the several methods tested at the United States Pasture Research Laboratory, State College, Pennsylvania, for the inoculation of red and Ladino clovers with *Sclerotinia trifoliorum* [*R.A.M.*, 28, p. 402], the best results were obtained with cultures on grain dried by fanning at a temperature of 20° to 22° C. [cf. ibid., 17, p. 252; 29, p. 467], passed through the 'coarse' disk of a household food chopper, and screened in a 14-mesh sieve. There was no appreciable reduction in pathogenicity in the dried grain inoculum after more than two years' storage at 0° to 5°.

Luttrell (E. S.). **Diseases of Guar in Georgia.**—*Plant. Dis. Reptr*, 35, 3, p. 166, 1951. [Multilithed.]

During the summer of 1950, plantings of guar (*Cyamopsis tetragonoloba*) in the Southeastern Regional Plant Introduction Nursery at the Georgia Experiment Station were severely injured by white mould (*Sclerotium rolfsii*) [*R.A.M.*, 29, p. 568; 30, p. 447] and a leaf spot tentatively referred to *Alternaria cucumerina* or to a fungus of this group [cf. ibid., 28, p. 295]. Both diseases may prove to be important factors in limiting the production in Georgia of guar as a green manure or (more especially) seed crop. None of the 55 strains in the planting, all recently introduced from India, showed satisfactory resistance to either disease. Owing to the extremely dry season the incidence of white mould was exceptionally high. The disease was present throughout the summer and affected plants of all ages, causing moderate reductions in stands of all strains.

The *Alternaria* leaf spots were roughly circular, 3 to 6 mm. in diameter, tan to brown and surrounded by a narrow, dark brown border, entire or irregularly dentate. Concentric ridges in the dead leaf tissue imparted a zonate appearance to the spots. The leaves were heavily marked also with small, angular, dark brown spots which often became confluent and formed an irregular patchwork. Black flecks and oval to elliptical spots, 0·5 to 2 mm. long, were present on the stems, the lesions being slightly depressed to raised and often confluent, producing a black discoloration over areas of the stem. The pods were covered with short, obliquely transverse, black streaks, which became confluent and formed black patches. Some of the seeds in infected pods were shrivelled and black and covered with a white mycelium. The apex of the conidium terminated in a long, delicate, hyaline, continuous to biseptate process often longer than the body of the conidium and 2·2 to 2·8 μ in diameter. The conidia, including the apical process, measured 81 to 199 by 13·4 to 23·8 μ.

Hanson (C. H.). **New forage varieties for North Carolina.**—*Res. & Fmg, N.C.*, 9, pp. 24–25, 1950. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 122, 1951.]

In this review of forage crop breeding in North Carolina it is stated that work on the development of big trefoil strains resistant to foliage blight caused by *Rhizoctonia* [*Corticium*] *solani* is in progress. A Korean strain of *Lespedeza* [*R.A.M.*, 25, p. 563] designated FC31480-43, highly resistant to powdery mildew [*Microsphaera diffusa*: ibid., 28, p. 18], was produced in co-operation with the Division of Forage Crops and Diseases, Beltsville, Maryland.

Zacha (V.). **Alternaria tenuis jako původce hniloby ovoce.** [*Alternaria tenuis* as an agent of fruit rot.]—*Ochr. Rost.*, 23, 4, pp. 349–352, 2 figs., 1950. [Russian and English summaries.]

Isolations from a diseased Ontario apple from southern Moravia, Czechoslovakia, yielded *Alternaria tenuis* [*R.A.M.*, 22, p. 395; 25, p. 579]. Inoculations of healthy apples resulted in infections and the fungus was re-isolated. The same fungus was isolated from infected oranges imported from Israel [cf. ibid., 26, p. 449].

Weaver (L. O.). **The constriction disease of Peach in Maryland.**—*Plant Dis. Reptr*, 35, 3, p. 144, 1 fig., 1951. [Multilithed.]

In the autumn of 1949, Golden Jubilee peach trees near Westover, Maryland, were severely affected by constriction disease (*Diaporthe eres*) [*D. perniciosa*: *R.A.M.*, 21, p. 378]. Elberta and Hale Haven were only slightly attacked. In the following spring Golden Jubilee was affected in other orchards. In certain seasons the disease is of major importance on the Eastern Shore of Maryland. Growers should avoid susceptible varieties when planting new orchards.

Rieuf (P.). **Le dépérissement des Abricotiers. I. État des recherches en France et à l'étranger. II. Situation et recherches au Maroc.** [Apricot wilt. I. State of researches in France and abroad. II. The situation and researches in Morocco.] —*Fruits et Primeurs*, 20, 219, pp. 354–357; 220, pp. 393–395, 3 figs., 1950.

In the first of these papers the author recapitulates and classifies the results of researches carried out in France and other countries over many years on the causes of apricot die-back [*R.A.M.*, 6, p. 237; 7, p. 179; 11, p. 791; 15, p. 591; 27, p. 570; 30, p. 171].

In the second he states that 'apoplexy' has probably long been endemic in Morocco [cf. ibid., 8, p. 656]. An epidemic outbreak occurred in 1938, and records since then show that numerous fungi have been isolated from the dead trees. The author has consistently isolated a *Verticillium* from the vessels, but most of the

affected trees appeared to have been badly planted in unsuitable soil, the fungus merely aggravating their debilitated condition. In 1939 *Fusarium oxysporum* was associated with *Macrophomina phaseoli* in the vessels of wilting trees; in 1949 a *Fusarium* of the *elegans* group was associated with a *Cylindrocarpon*; and in 1950 *V. albo-atrum* [cf. ibid., 27, p. 139] was isolated. The fungus, often associated with *F. oxysporum*, was present in vessels with a brown discoloration and an accumulation of gum. The discoloration appeared to spread vertically above and below wounds in the trunk. In this case, the author considers, the 'apoplexy' was due to *V. albo-atrum* and *F. oxysporum*, which had effected an entry through wounds. It is probable that parasites already present in the tissues may kill off the trees more or less rapidly according to the environmental conditions.

Apricot 'apoplexy' in Morocco could be effectively controlled or at least retarded by improved cultural practices.

Wood (C. A.). **The Strawberry aphid, Pentatrichopus fragariae (Theob.), in North Wales, with special reference to the maintenance of healthy Strawberry stocks in non-fruit-growing areas.**—*J. hort. Sci.*, 26, 1, pp. 22–34, 3 graphs, 1 map, 1950.

From a detailed survey from 1940 to 1945 the author demonstrates the extent to which the strawberry aphis *Pentatrichopus* [*Capitophorus*] *fragariae* [*R.A.M.*, 28, p. 341 and next page] has existed as an economic pest in the two main fruit-growing districts of North Wales [*Ann. appl. Biol.*, 27, p. 234, 1940]. Infestations of the size recorded produce serious spread of [unspecified] virus diseases, with specially drastic losses resulting from the infection of uncropped maiden plantations. *Empusa planchoniana* [*R.A.M.*, 17, p. 240] is a frequent parasite of *C. fragariae*, but in 1938, 1943, and 1944, when populations were high it did not prevent widespread migration of alatae nor the resulting serious spread of virus infection. Alatae were prevalent for at least six weeks, mainly during late May and June. An examination of meteorological data indicated that such migration is likely to occur in the lower Dee Valley in almost any year in which large aphid populations are present.

Miller (P. W.) & Aldrich (F. D.). **Studies on the detection of viruses in the leaves of Strawberries by the Lindner staining procedure.**—*Plant Dis. Reptr*, 35, 3, pp. 131–133, 2 figs., 1951. [Multilithed.]

During 1950 the authors carried out extensive tests at Oregon Agricultural Experiment Station on the applicability of the Lindner staining technique [*R.A.M.*, 29, p. 602] to the detection of viruses in strawberries [see preceding and next abstracts]. Over 500 plants, including three wild species (*Fragaria chiloensis*, *F. vesca*, and *F. ovalis*), Marshall, Brightmore, Donner, Lassen, Rockhill, Corvallis, Sierra, and Northwest cultivated strawberries, and more than 25 unnamed hybrids were used. The results showed that leaves from plants with severe yellows [strawberry yellow edge virus: see next abstract] and severe crinkle [strawberry crinkle virus: loc. cit.] stain positively by the Lindner method. The conducting tissues of leaves severely affected by yellows stain deep pink or red, especially in the midribs and primary veins. Leaves of plants with severe crinkle show localized or diffused patches of red or pink in the lamina and little if any staining of the veins. Older leaves stain more intensely than younger ones. Plants mildly affected with yellows or crinkle gave conflicting colour reactions, e.g., on one occasion the leaves of a plant with mild yellows stained positively, though some weeks later other leaves from the same plant gave a negative reaction. A red pigmentation in the leaf serrations and a light pink lamina frequently occurred in the leaves of Marshall plants indicated to be virus-free by runner-grafting to healthy *F. vesca* indicators [loc. cit.]. Leaves of plants affected by powdery mildew [*Sphaerotheca humuli*: ibid., 28, p. 580; 30, p. 15] stained pale pink in patches where lesions were present.

It is concluded that the Lindner staining procedure has definite limitations in respect of the detection of strawberry virus diseases. Plants with severe symptoms of crinkle or yellows can be positively identified by this technique, but those mildly affected cannot. It does not appear to be a reliable method for separating healthy from infected plants.

Miller (P. W.). **Wild Strawberries as a source of Strawberry virus infection.**—*Plant Dis. Reptr*, 35, 3, pp. 129–130, 1951. [Multilithed.]

In tests at Oregon Agricultural Experiment Station in 1950 apparently healthy wild strawberry plants (*Fragaria chiloensis*, *F. ovalis*, and *F. vesca*) native to Oregon from over 50 widely separated localities were stolon-grafted to healthy, virus-sensitive *F. vesca* [*R.A.M.*, 30, p. 478] indicator plants, or colonized with non-viruliferous aphids [*Capitophorus fragariae*: see preceding page and next abstract], which were then transferred to the indicators.

Viruses were found in plants of *F. chiloensis* from five of 14 localities and in *F. ovalis* from seven of 31. None was detected in wild *F. vesca*. Though the percentage of infected clones collected in any one area was usually somewhat low, in one case half the clones tested were infected. Some of the affected wild plants were remote from any cultivated strawberries. It appears probable that these two native species are original hosts of at least some strawberry viruses, and it is evident that they contain sufficient infection to constitute a virus reservoir that might cause infection of cultivated strawberries growing in the vicinity. The presence of seemingly virus-free clones raises the question whether such clones may be immune or may have escaped infection. In both infected species the viruses are latent or masked. The presence of wild strawberries near cultivated fields will have to be taken into account in the general control programme.

Frazier (N. W.). **Fragaria bracteata Heller as an indicator plant of Strawberry viruses.**—*Plant Dis. Reptr*, 35, 3, pp. 127–128, 1951. [Multilithed.]

In preliminary surveys of the viruses present in commercial strawberry plantings in California *Fragaria bracteata* proved an excellent indicator plant. The East Malling strain and a runnerless Alpine variety of *F. vesca* [see preceding abstracts] were also used. In one type of test healthy indicators were colonized with *Capitophorus fragaefolii* [*C. fragariae*: loc. cit.] from diseased commercial field plants, one to ten aphids per plant for from six to over 15 days. Fourteen of the 75 inoculated indicator plants developed chlorotic, stunted, yellows type symptoms [strawberry yellow edge virus: cf. *R.A.M.*, 27, p. 430; 30, p. 174] after an inoculation period of one month or more, unaccompanied by mottling, marginal chlorosis, or leaflet cupping. Crinkle type symptoms [strawberry crinkle virus: ibid., 27, p. 430; 30, p. 99] appeared in 33 plants after one to three weeks. A mild type of crinkle could be distinguished from a more severe type, often resulting in early death. There appeared to be intergradation between the two types. Sometimes both the yellows and crinkle were produced by different single aphids removed from a single leaf of the inoculum plant.

The second type of test consisted in giving non-infective aphids, placed on potted, fumigated, diseased field plants with typical or atypical yellows symptoms, acquisition feeding periods of from two to ten days. Lots of ten were then transferred daily to successive healthy *F. bracteata* plants until all the insects were dead. All test plants inoculated on the first transfer developed crinkle symptoms; all five plants inoculated from typical yellows plants developed the least severe symptoms, whereas 22 plants inoculated from typical crinkle or the other atypical source plants developed severe crinkle, 17 having the rapidly lethal type. Yellows symptoms only were produced irregularly, beginning with the second set of indicator plants and continuing up to the fifteenth. In all, 66 of 270 inoculated indicator

plants developed yellows, which varied in severity and in the presence of a type of chlorotic spotting in some plants. Some of the variation could be correlated with individual inoculum plants. Both the crinkle and yellows types of disease appeared to be caused by more than one virus or by a complex of viruses.

A third basic type of symptom, observed occasionally on *F. bracteata*, consisted in an umbrella-like downward arching of the midrib. The midrib often lay at the bottom of a shallow trough formed by a slight inward folding of the leaflet margins. Severity varied conspicuously and considerable stunting was sometimes present. This type is in the non-persistent crinkle group.

These results are essentially similar to those reported from England [ibid., 27, pp. 140, 571].

Scott (D. H.), Jeffers (W. F.), Darrow (G. M.), & Ink (D. P.). **Further studies on the response of Strawberry varieties and selections to strains of the red stele root disease fungus.**—*Plant Dis. Reptr*, 35, 3, pp. 134–145, 1951. [Multilithed.]

In further tests of the resistance of strawberry varieties and selections to *Phytophthora fragariae* [*R.A.M.*, 29, p. 468], Suwannee again proved susceptible to both strains, A and S. Climax, Fairland, Redcrop, and Vermilion were very resistant to A and susceptible to S. Vermilion appeared to be more resistant to strain A than any other variety tested. Marshall was less susceptible than Suwannee to A. Of the selections used, Md. 1972 was susceptible to A, but resistant or highly resistant to S. Three selections were resistant or highly resistant to strain A; US 3535 and US 3538 were moderately resistant to both. It should not be difficult to develop varieties resistant to both strains.

Demaree (J. B.) & Morrow (E. B.). **Relative resistance of some Blueberry varieties and selections to stem canker in North Carolina.**—*Plant Dis. Reptr*, 35, 3, pp. 136–141, 1 fig., 1951. [Multilithed.]

Most cultivated fields of the south-eastern highbush blueberry (*Vaccinium australe*) in North Carolina and most plantings of unselected seedlings of the rabbit-eye species (*V. ashei*) in Alabama, Mississippi, Florida, and Georgia are infected to some extent by stem canker (*Physalospora corticis*) [*R.A.M.*, 22, p. 214]. Of the varieties from northern States, where the disease has not been reported, Atlantic, Jersey, and Scammell are highly resistant when grown in the south, Pemberton, Rancocas, and Rubel moderately so, and Dixi and Weymouth highly susceptible [loc. cit.].

There is little foundation material in northern varieties and selections that can be used to develop resistant blueberries. A few selected wild North Carolina highbush blueberry clones, known as Crabbe selections, have been found very valuable for transmitting resistance when crossed with northern varieties possessing desirable fruit qualities, even though the northern varieties used are highly susceptible. Two adequately resistant varieties, Murphy and Wolcott, which have been developed from this parent combination, have been released for unrestricted propagation, and others are being tested. All standard rabbit-eye varieties are immune or highly resistant.

Martyn (E. B.) & McIlwaine (A.). **Banana leaf spot disease control in Jamaica.**—*Bull. Dep. Agric. Jamaica*, N.S., 46, 33 pp., 16 pl., 2 figs. (1 col.), 1 map, [? 1950].

This compilation briefly reviews the history of and research on banana leaf spot (*Mycosphaerella musicola*) [*R.A.M.*, 29, p. 628] in Jamaica, and outlines in detail the organization of the control programme inaugurated in 1939 [ibid., 20, p. 153]. In 1945 the Banana Leaf Spot Control Central Committee [ibid., 29, p. 459] was

established. It is responsible for purchasing and distributing all materials and equipment and for instructing growers how to spray, but the Banana Leaf Spot Control Board [ibid., 21, p. 242] controls finances and policy. The intention is that leaf spot control shall eventually pass entirely into the hands of the industry.

A detailed study of the disease [ibid., 26, p. 250] indicated that the most economical treatment would be intensive spraying at intervals of three weeks from March to October, but most growers aim at attaining about 12 spraying cycles a year in all, though in many cases fewer are achieved.

For administrative purposes the island is divided into four Divisions. In each there is an advisory committee, which advises the Central Committee about local matters, and a Senior Supervisor with a field staff in proportion to the size of the Division.

Growers wishing to undertake spraying must apply on an official form. The field is then inspected to ascertain if it is reasonably well cultivated and to estimate the acreage to be sprayed. The grower is then asked to sign an agreement governing the use of equipment and materials, after which he is given a registration card enabling him to draw supplies of materials. If his acreage is large enough he is allowed to borrow a spray pump with hose, etc. If it is very small he shares a pump with other growers. The first time he sprays a member of the staff is present to instruct him; during the first six months he is visited frequently and later occasionally.

Spraying materials for 4-4-50 Bordeaux mixture are issued free to all growers and constitute the largest item of expenditure borne by the organization. Lime is purchased from a local manufacturer under a five-year contract at £7. 5*s*. per ton ex plant, the Committee providing the bags. The present price of copper sulphate is about £49 to £50 per ton. Copper sulphate 'snow' is preferred, as growers are apt to use a weaker solution if the crystals take too long to dissolve. The big grower (100 acres or more) is given enough for 17 cycles (one every three weeks) at 150 gals. per acre. The grower with 20 to 100 acres receives sufficient for 12 cycles per year at 120 gals. per acre, and the small grower (under 20 acres) enough for 100 gals. per acre per month.

The pumps at present issued are: (1) Hardie xv power sprayer, made by the Hardie Mfg. Co., Michigan (two models are in use, one stationary, the other movable), (2) Hardie 99 power sprayer, (3) Bean Spartan sprayer (John Bean Mfg. Co., Lansing, Michigan), (4) two types of headland pumps, one the Drake and Fletcher, Maidstone, Kent, the other the Vermorel, a French make supplied by Cooper Pegler, Chipstead, Surrey, (5) Hardie No. 6 barrel pump, (6) Dobbins' barrel pump (Dobbins Mfg. Co., New York), and (7) Leader stirrup pumps (Eclipse Spraying Co., Birmingham). Knapsack sprayers are no longer used.

The cost of spraying, including labour, equipment, and materials, was recently estimated to amount in the Central Division, where small growers predominate, to 1*s*. 9*d*. per count bunch, (i.e., one of nine hands or more at 60 counts per acre), allowing 10 spraying cycles; to-day the figure would probably be at least 2*s*. The total proportion of bananas sprayed is estimated to be perhaps rather over 50 per cent. of those grown. The organization by means of its publicity endeavours to show the necessity for spraying and to instruct the growers.

The sprayed fruit is washed in a sodium bisulphate bath (22 lb. sodium bisulphate per 100 gals. water). Two types of washing apparatus are used. One consists of two wooden 300-gal. tanks, one filled with solution, the other with fresh water. The fruit is dipped three or four times in the first and when all the Bordeaux deposit has been removed is washed in the second. The second type is a washing machine, in which the bunches are placed on a continuous electrically operated conveyor. The fruit is first washed with the solution and then with water by means of special nozzles above and below.

Miller (R. E.). **Agricultural diluents.**—*Agric. Chemicals*, 5, 11, pp. 43, 45, 47, 78–79; 12, pp. 45–48, 93–95, 1950.

After pointing out that it has only recently been realized that the so-called inert diluents used in fungicidal and other dusts are almost as important to the proper compounding and performance of such dusts as are the active ingredients themselves [cf. *R.A.M.*, 23, p. 493], the author discusses, with numerous references to the literature, the use of such diluents and various factors which may influence their effectiveness, such as particle size, density, fluidity, humidity, pH, absorbing power, compatibility, adhesiveness, specificity, toxicity, action, and formulation. Diluents may increase, decrease, or nullify the fungicidal toxicity of certain active ingredients.

Sayers (Nesta F.). **A biological glossary.**—168 pp, London, University of London Press, Ltd., 1951. 5*s*.

This glossary of botanical and zoological terms (with their Greek or Latin derivations) and names, intended mainly for senior forms in schools and first-year students at the University, is a useful work of reference.

Palti (J.) & Minz (G.). **Estimation of the incidence and destructiveness of plant diseases. I. Terminology and outline of the technique of visual appraisal.**—*Bull. Res. Coun. Israel*, **1**, 1–2, pp. 76–97, 1951.

After briefly reviewing the literature on plant disease estimation [cf. *R.A.M.*, 29, p. 521] the authors define precisely a number of terms used to denote the stages and objects of the process. The degree of infection of living tissue (with which visual appraisal of incidence is usually concerned) may be estimated by the number of lesions present or the area of affected tissue, the latter criterion being preferable; effects such as tissue drying or leaf shedding can be accurately appraised only if due to a single cause. The choice of the unit of appraisal (individual plant organs, part of such organs, individual branches or plants, whole plots or parts of plots) depends on the growth habit of the host, the purpose of the estimation, and the degree of accuracy desired. Appraisal by small units (leaves) is the most accurate method, though laborious. Scales of categories for the estimation of plant disease by small and larger units are outlined. In the case of leaf diseases the scale [ibid., 29, p. 626] is: category (a), the leaf free from disease: healthy; (b) not more than two to three lesions per leaf or up to $\frac{1}{10}$ of the leaf surface affected: trace; (c) not more than $\frac{3}{10}$ of the leaf surface affected: light infection; (d) not more than $\frac{6}{10}$ affected: moderate; (e) more than $\frac{6}{10}$ affected, but the leaf does not yet dry up: severe; and (f) the leaf begins to dry up: very severe. The same categories (A to F) are also applied to individual branches or plants, each category being defined both by the proportion and the number of component parts in each degree of infection; to take one example, category C (light infection) is defined as 'not more than three-quarters of the number of infected leaves placed in category (c), few leaves in (d), and the remainder in (b)'; or as 'not more than eight [out of 10] leaves in category (c), one in (d), and one in (a)'. This range of categories is also applicable to groups of plants. Correct sampling of its primary importance and methods of doing this are critically reviewed. Methods of evaluating the data collected by this method are to be described later.

Rayss (T[scharna]), Shulov (A.), Ingster (J.), & Sandovsky (N.). **Étude préliminaire des champignons qui attaquent les toiles des tentes en Israël.** [Preliminary study of the fungi attacking tent canvases in Israel.]—*Palest. J. Bot.*, J. Ser., 5, 1, pp. 56–69, 1950. [Hebrew summary.]

During the exceptionally long and comparatively mild winter of 1948–9, tent

canvases in Israel sustained heavy damage from fungal infection, the most important (in the order named) of the organisms isolated on potato and carrot agar being *Stachybotrys atra* [*R.A.M.*, 29, p. 323], *Chaetomium pannosum*, *C. spirale* [ibid., 29, p. 585], and two other *C.* spp., *Stemphylium verruculosum* [cf. *S. consortiale*: ibid., 24, p. 42], *Torula chartarum*, and species of *Trichoderma*, *Penicillium*, *Hormodendrum*, and '*Monilia*'. *Memnoniella echinata* [ibid., 29, p. 375 *et passim*], isolated from a single sample of unknown origin, thrives only in the presence of filter paper or fragments of canvas. Complete protection was conferred by half-an-hour's immersion of the material in phenyl mercuric borate [ibid., 27, p. 251] at a concentration of 1 gm. in 200 ml. or even of 1 in 1,000, the efficacy of which was not impaired by six hours' subsequent washing with water.

Brown (Frances C.) & Bradsher (C. K.). **Mildew-preventing activity of rhodanine derivatives.**—*Nature, Lond.*, 168, 4265, p. 171, 1951.

By condensation with aldehydes and ketones over 100 derivatives of rhodanine [*R.A.M.*, 28, p. 74], the majority of which possessed marked mildew-proofing activity, were obtained in the Laboratory of the Department of Chemistry, Duke University, North Carolina. They contain a chemical grouping present in many fungicides (tetramethylthiuram disulphide and the salts of dithiocarbamic acid). Most of these compounds prevented deterioration in uniform strips of dyed herring-bone cotton twill impregnated with 2 per cent. of the fungicide and incubated for two weeks on mineral salts agar with pure cultures of *Aspergillus niger* and *Chaetomium globosum*. Eighteen of the compounds afforded similar protection to similar strips buried for two weeks in soil. Under the same conditions cloth strips impregnated with chloranil [ibid., 29, p. 370] lost 80 per cent. or more of their tensile strength. In four weeks' soil burial tests the most active compounds were the 2-thenylidene, *p*-methyl*cyclo*-hexylidene-, *α-n*-amylhexylidine-, *o*-methyl*cyclo*-hexylidene-, and *p*-chlorobenzylidene-rhodanines, all of which prevented losses of over 25 per cent. tensile strength.

Reese (E. T.), Levinson (H. S.), Downing (Mary H.), & White (W. L.). **Quartermaster culture collection.**—*Farlowia*, 4, 1, pp. 45–86, 1950. [Received April, 1951.]

This is an alphabetical list of the 830 cultures of fungi, bacteria, actinomycetes, and yeasts being maintained in the collection at the Quartermaster Research and Development Laboratories, Philadelphia, Pennsylvania, isolated by this and collaborating laboratories from exposed and deteriorating industrial materials. Criteria used as a basis for selecting cultures were frequency with which the isolate has been used in studies here and elsewhere, morphological or physiological variation within the species, authenticity of identification, nature of the substratum from which the isolations were made, and place of origin. Most of the organisms are of wide occurrence and the frequency of distribution is similar in widely separated areas. Some details of culturing are given. *Aspergillus repens* grows well on electrical insulations [cf. *R.A.M.*, 29, p. 166], as it can withstand high osmotic concentration and relative low humidity; *Tritirachium roseum* is able to grow on nylon; *Microsporum gypseum*, *Trichophyton mentagrophytes* [ibid., 30, p. 282], and many other organisms can grow on autoclaved wool; *Memnoniella echinata* [ibid., 28, p. 585] destroys cellulose [see next abstract], but requires biotin, *A. niger* grows on leather [ibid., 28, p. 476], and *A. versicolor* on plastics.

The bibliography lists 52 titles.

Siu (R. G. H.) & Sinden (J. W.). **Effects of pH, temperature, and mineral nutrition on cellulolytic fungi.**—*Amer. J. Bot.*, 38, 4, pp. 284–290, 10 graphs, 1951.

In studies at the Quartermaster General Laboratories, Philadelphia, and the Department of Botany, Pennsylvania State College, on cellulolytic fungi isolated

from deteriorated cotton fabrics [see preceding abstract] *Myrothecium verrucaria* [*R.A.M.*, 30, pp. 60, 115, 182] was characterized by a uniformly high rate of cellulose decomposition between relatively wide limits of physical and nutritional conditions. The pH optima for *Curvularia lunata* [ibid., 29, p. 404; 30, pp. 121, 182], *Aspergillus flavipes* [ibid., 28, p. 585; 30, p. 483], and *M. verrucaria* fell within the range 6 to 7, while the optimum temperature for these fungi and *Gliomastix convoluta* [ibid., 29, p. 166] was about 29° C. With the possible exception of magnesium, omission of macronutritional elements resulted in marked decrease in cellulolytic activity [cf. next abstract]. Added magnesium was not essential for the degradation of cellulose, though mycelial growth was much suppressed by its absence. *G. convoluta* is distinctly different in its nutritional requirements and appears to require nitrogen in an organic form, such as glutamic acid or yeast extract. The other three species attacked cotton fabric vigorously in an otherwise purely inorganic medium. Added biotin stimulated the cellulolytic activity of *A. flavipes* in concentrations of 2 γ per l. It appears that *M. verrucaria* does not degrade cellulose until it is no longer capable of growing on the more easily accessible sugars as a source of carbon.

Textiles for the services. Rot and mildew proofing. The search for reliable treatments.—*Text. Merc.*, 123, 3215, pp. 801–802, 1950.

With a view to the development of new fabrics for military uniforms and equipment with enhanced resistance to damage by micro-organisms, extensive tests covering the next three years are planned by the United States Army and Department of Agriculture. One station is to be established at Las Cruces, New Mexico, and at least two more in the Caribbean and South Pacific.

Experimental work at the Shirley Institute, Manchester, has shown that moulds are unable to thrive on raw cotton from which the potassium, sodium, calcium, and magnesium constituents have been removed by complete scouring [cf. preceding abstract]. Salicylanilide (shirlan) is one of the most effective mildew-proofing products, while chrome-proofing [*R.A.M.*, 25, p. 131] confers a high level of protection against the rotting of materials exposed to outdoor conditions.

Basu (S. N.), Bhattacharyya (A. P.), & Bose (R. G.). **A multiple culture technique for testing rot-resistance, particularly suited to Jute materials.**—*J. Text. Inst., Manchr*, 41, 12, pp. T466–T480, 3 figs., 1950.

A method has been devised at the Indian Jute Mills Association Research Institute, Calcutta, for the evaluation of rot resistance of textiles, designed primarily for use on jute [*R.A.M.*, 27, p. 378] and to obviate the drawback inherent in single culture tests of fungal specificity towards antiseptics. The method involves simultaneous inoculation with five species of fungi which occur frequently on jute and were shown by tests to possess marked tendering abilities. From different portions of the proofed fabric to be tested, both unleached and leached for 24 hours in excess distilled water, and also from an untreated control sample four strips or more measuring approximately 10 in. long are cut and ravelled down to 14 warp threads. The strips are fastened in pairs across the middle of a 10-cm. Petri dish from edge to edge, which is then placed inside a larger one. A mixed inoculum is prepared of *Chaetomium indicum* [ibid., 30, p. 39], *Aspergillus fumigatus* [loc. cit.], *Curvularia lunata* [ibid., 30, p. 182], *Penicillium rubrum*, and *P. wortmanni* by taking equal quantities of equivalent spore suspensions and this is sprayed uniformly on to the strips, using approximately 1·5 ml. per dish. About 10 ml. of tap water is then introduced into the inner dish and the whole assembly placed in an incubator at 30° C. for 14 days (or 21 when the proofing is exceptionally efficient). At the termination of the incubation period, when the control slips should be

covered with perithecia of *Chaetomium indicum*, the organisms are killed by putting a few drops of ethyl alcohol in the outer dish and leaving for two hours. The strips are conditioned at 70° F. and 68 per cent. relative humidity for two days, and are broken in a vertical Goodbrand machine with 5 in. between grips. The results are expressed as the mean tensile strength of the four replicates and the percentage loss in strength.

The efficiency of the method was compared with other procedures, viz., moist chamber tendering, moist chamber growth rating, soil incubation, outdoor soil burial, and single pure culture, using *Chaetomium indicum*. The proofing treatments used were (1) sodium pentachlorophenate dissolved in water; (2) cuprammonium [ibid., 30, p. 60], applied by a one-bath process; and (3) copper naphthenate in solvent oil. As regards the relative efficiency of the proofing treatments the multiple culture test gave results agreeing with others based on loss in strength, but the single culture test did not.

The fabric proofed with copper naphthenate was superior in rot resistance to the cuprammonium-treated fabric, though the former chemical contained much less copper than the latter. As the leachability of the copper was similar in both cases, this appears to support the view that the naphthenate radicle itself has some toxicity [cf. ibid., 27, p. 84]. Cuprammonium reduced the strength of the fabric. Sodium pentachlorophenate (containing 0·56 per cent. pentachlorophenol unleached and 0·08 per cent. leached), besides being highly leachable was not suitable as a proofing agent at the concentration used.

Ohtsuki (T.), Suda (Y.), & Sai (M.). **Studies upon the glass-mould. I. Isolation from moulded glass.**—*Misc. Rep. Res. Inst. nat. Resources, Tokyo*, 17–18, pp. 69–77, 2 figs., 1950. [Japanese, with English summary.]

Moulds from malt agar cultures which were able to grow on optical glass [cf. *R.A.M.*, 29, pp. 44, 575] under controlled conditions of extreme humidity in experiments at Ochanomizu University, Japan, included species of *Penicillium*, *Aspergillus*, *Monilia*, *Alternaria*, *Heterobotrys* [*Atichia*], *Glenospora* [? *Aleurisma*], and *Cladosporium*. Under natural conditions no spore germination occurs on glass. However, a mould which was actually cultured on glass under natural conditions is described as *Aspergillus glaucus* var. *tonophilus* n. var. [without a Latin diagnosis].

Miwa (T.) & Fujita (T.). **Studies on the formation of glycosidases in molds with special reference to the specificity.**—*Misc. Rep. Res. Inst. nat. Resources, Tokyo*, 17–18, pp. 101–107, 1950. [Japanese summary.]

At the Botanical Institute, Bunrika Tokyo University, Japan, a definite and constant difference in relative specificity was observed between the β-glucosidases produced by *Aspergillus niger* and *A. oryzae*, notwithstanding the close systematic relationship between these two species of moulds.

Okunuki (K.), Matsukura (T.), Shibata (S.), Hizumi (Y.), Miura (Y.), Toyoizumi (Y.), & Kitamura (R.). **Studies on antimicrobial activities of red yeast, I. On the production of lipid and its chemical analysis.**—*Misc. Rep. Res. Inst. nat. Resources, Tokyo*, 17–18, pp. 118-125, 1 fig., 1950. [Japanese, with English summary.]

The results of studies at the Universities of Osaka and Tokyo, Japan, demonstrated that the anti-tubercular and anti-fungal attributes of *Rhodotorula suganii* reside in the acetone-soluble fat fraction of the red yeast. A very powerful antimicrobial effect was exerted *in vitro* by oleic acid, one of the principal components of the active fat fraction.

Brian (P. W.). **Antibiotics produced by fungi.**—*Bot. Rev.*, 17, 6, pp. 357–430, 1951.

In the first part of this paper the records of antibiotic production in each of the taxonomic groups of fungi are considered in turn, account being taken of negative results as well as of positive indications of antibiotic production. In the second brief notes are given on the characters of the antibiotics [cf. *R.A.M.*, 30, p. 335], based on their more important physical, chemical, and biological properties. The data indicate that of the 2,191 species of 245 genera tested, 785 species in 120 genera are active. At present fungi are known to produce about 96 apparently distinct antibiotics; many obtained in the crude form only are possibly identical with others. Only 57 have been well characterized, and of these 48 have been obtained from Fungi Imperfecti, eight from Basidiomycetes, and one from Ascomycetes. Much more attention has been paid by workers to the Moniliales and Agaricales than to any other groups, and in these two orders 51 and 36 per cent., respectively, of the species examined have shown activity. Phycomycetes have not been closely studied, and the Sphaeropsidales and Melanconiales have been almost completely neglected. Most of the antibiotics isolated have been tested against only a limited number of bacteria of purely medical importance. In general, antibiotics show no chemical unity as a class, but nearly all are lipoid-soluble and only sparingly water-soluble; many are acidic.

A bibliography of 276 titles is appended.

Brunner (J. R.) & Mallmann (W. L.). **Effectiveness of dehydroacetic acid as a mold inhibitor on butter and cheese surfaces.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 2, pp. 127–142, 7 figs., 1950.

In studies carried out at Michigan State College to determine the effectiveness of dehydroacetic acid and its sodium salt [*R.A.M.*, 30, p. 183] in suppressing surface moulds on stored butter and cheese [loc. cit.], *Penicillium roqueforti* [ibid., 30, p. 384] was inhibited on agar at a concentration of 0·03 per cent. and *Rhizopus nigricans* [*R. stolonifer*] at 0·03 to 0·05. One per cent. water solutions of the sodium salt, used as a dip or as an impregnating material for parchment wrappers, virtually eliminated surface moulds on butter and cheese during storage. Preliminary trials indicated that a 1 per cent. water solution of the salt, sprayed on to mouldy surfaces, effectively suppressed mould growth.

Schelhorn (M. v.). **Untersuchungen über den Verderb wasserarmer Lebensmittel durch osmophile Mikroorganismen. I. Verderb von Lebensmitteln durch osmophile Hefen. II. Mitteilung. Grenzkonzentrationen für den osmophilen Schimmelpilz Aspergillus glaucus in Abhängigkeit vom pH Wert des Substrates.** [Studies on the spoilage of foodstuffs of low moisture content by osmophilic micro-organisms. I. Spoilage of foodstuffs by osmophilic yeasts. Note II. Limiting concentrations for the osmophilic mould *Aspergillus glaucus* in relation to the pH value of the substratum.]—*Z. LebensmittUnters. u. -Forsch.*, 91, 2, pp. 117–124; 5, pp. 338–342, 1 graph, 1950.

The micro-organisms capable of withstanding the highest osmotic pressures in foodstuffs are the osmophilic yeasts, represented in the author's studies at the Munich Institute of Food Technology by *Zygosaccharomyces barkeri* [cf. *R.A.M.*, 27, p. 251], which was able to multiply in syrups with a concentration of up to 84 per cent. of the dry substance (62 per cent. relative humidity) at the optimum pH of 4 to 5 and a storage temperature of 30° C. Thus, fruit essences and the like, which are too highly concentrated to permit of mould contamination, may still be attacked by osmophilic yeasts.

Aspergillus glaucus [ibid., 26, p. 558] thrives on neutral to slightly acid substrata. The limit for macroscopically discernible mould development at 30° on foodstuffs

of high sugar content lies between 72 and 73 per cent. relative humidity at neutrality, whereas on definitely acid substrata the mould is much less resistant to high osmotic levels. Acidification would thus be a practicable means of protecting syrups, malt extract, fruit essences, confectionery, and so forth, from mould spoilage. *Penicillium 'glaucum'* is much more resistant to acid than *A. glaucus*, but far less tolerant of high osmotic levels.

GÄUMANN (E.) & JAAG (O.). **Bodenbewohnende Algen als Wuchsstoffspender für bodenbewohnende pflanzenpathogene Pilze.** [Soil-inhabiting algae as sources of growth substances for soil-inhabiting plant-pathogenic fungi.]—*Phytopath. Z.*, 17, 2, pp. 218–228, 5 figs., 1951.

Although there are probably few completely auxin-heterotrophic parasitic fungi, many benefit by the addition of growth substances to their food supply and respond to them by more abundant growth. Soil-inhabiting algae were shown by experiments at the Federal Technical College, Zürich, Switzerland, to be particularly rich in auxins: for instance, all the 18 species, selected at random from various orders of green algae, proved to be vitamin B_1-autotrophic and capable, moreover, of diffusing appreciable quantities through the nutrient medium. Two of the fungi used in the tests, *Polyporus adustus* and *Mucor ramannianus*, take about two months to react to the auxins supplied by certain algae, e.g., *Chlorella vulgaris*, *Chlorococcum humicola*, and *Coccomyxa pringsheimii*, after which period of suspension their development proceeds normally. As a rule the two partners develop independently side by side, but occasionally the algal cultures may suffer from the exclusion of light due to overgrowth by the fungal mats.

LOMBARD (P. M.). **The effect of a mild strain of latent mosaic virus X on yield of some of the new Potato varieties in Maine.**—*Amer. Potato J.*, 27, 12, pp. 445–449, 1950.

Seed stocks of the Chippewa, Sequoia, Sebago, and Teton varieties carrying a mild strain of virus X [see next abstract] and stock free from virus X were compared with commercial stock of each variety [cf. *R.A.M.*, 28, pp. 479, 637]. The yield reductions in the mild X and commercial stocks, respectively, were for Chippewa 6·1 and 6·8, Sequoia 2·1 and 0·2, Sebago 4·2 and 9·8, and Teton 9·5 and 5·1 per cent. Only in Teton mild X and Sebago commercial stocks did the reductions reach or closely approach significance, the X-free Teton yielding 58·4 bush. per acre more than Teton mild X. The fact that the yield from Sebago mild X was 9·8 per cent. higher than that of Sebago commercial may have been due to the fact that the latter generally carries a relatively virulent strain of virus X [ibid., 27, p. 151]. On the other hand, the yield from commercial Teton was 27·1 bush. per acre higher than that of mild X seed stock, probably because the particular lot of commercial Teton used had 48 per cent. of the plants free from X.

Potato research. Ex Sixty-Sixth Annual Report of Progress, June 30, 1950.—*Bull. Me agric. Exp. Sta.* 483, pp. 41–61, 1 fig., 1950.

In this report dealing with potato research in Maine [cf. *R.A.M.*, 30, p. 25], W. A. SHANDS, G. W. SIMPSON, R. M. COBB, and P. M. LOMBARD state that weekly applications of DDT (0·63 lb. per acre) in a spray containing yellow cuprous oxide substantially reduced the seasonal spread of leaf roll virus [ibid., 27, p. 86; 28, p. 78] in Chippewa potatoes with 3 per cent. seed piece infection. Preliminary relative toxicity tests in field plots during 1949 by G. W. SIMPSON, W. A. SHANDS, R. M. COBB, and F. S. ROBERTS indicated that the addition of an oil solvent (4 per cent.) to yellow cuprous oxide and 1·8 per cent. DDT may influence aphid control sufficiently to increase yields. The application of concentrated insecticide-fungicide

mixtures, using far fewer gallons per acre than usual, may provide satisfactory aphid control. The amount of leaf roll spread and consequent yield reduction in the Chippewa variety was positively related to the number of aphids on the plants during the summer and also to the abundance of unrogued potato plants with chronic leaf roll.

G. W. Simpson, W. F. Porter, E. L. Newdick, and R. M. Cobb report that crops in Florida from 1,171 'seed' samples from the 1949 Maine potato crop showed some spread of virus diseases during the summer, although the increased infection was not serious enough to affect the 1950 certification. More samples than usual developed spindle tuber [virus: cf. ibid., 27, p. 174 and next abstract], the most important disqualifying disease in Kennebec variety.

G. W. Simpson, W. A. Shands, and F. S. Roberts consider that the increased leaf roll infection in 1949 was due to favourable conditions for aphid development, greater infestation of weed hosts of the green peach aphid [*Myzus persicae*] than had occurred for some time, and the rapid emergence and growth of the potato plants. Spread would undoubtedly have been much more severe but for the more general use of DDT and other aphicides and the planting of seed relatively free from the disease.

Of 16 unnamed seedlings previously selected by R. Bonde, G. W. Simpson, and D. Merriam as being resistant to leaf roll, four showed no current-season symptoms when inoculated in 1949 with infective aphids. Six other seedlings developed from 8 to 40 per cent. diseased plants and are considered to be resistant under natural field conditions. The field spread in selected seedlings was tested by D. Folsom at Highmoor Farm with every third row planted with infected plants. About 25 per cent. of the seedlings received in 1947 and 1948, having passed the severe Aroostook Farm aphid transmission test, contracted leaf roll at Highmoor. A number of seedlings apparently resistant to leaf roll is being increased and used for breeding experiments.

During 1948 and 1949 spindle tuber caused considerable concern to some growers by appearing in certain seed stocks. Experiments conducted in 1949 by R. Bonde and D. Merriam confirmed previous information that the disease is readily spread by the cutting knife, by seed piece contact, and by contact of the young sprouts on the seed tubers. Rapid drying of the seed pieces before planting eliminated most of the spread by contamination. It also appeared to be reduced by disinfecting the freshly cut seed.

Seed tubers harvested in 1948 from plants suffering from black leg [*Erwinia carotovora*: ibid., 30, pp. 243, 286, 485] developed no disease when planted in New Jersey and only a trace when planted at Aroostook Farm. Injury of freshly cut infected seed stocks by exposure to dry air and sunlight increased the percentage of black leg in the Sebago variety.

The percentage of latent mosaic [potato virus X: see preceding abstract] in samples of farmers' seed stocks from Aroostook County varied from 2 to 98 per cent. Approximately 14,000 seed tubers were indexed in the greenhouse at Presque Isle and the healthy tubers obtained were planted at Masardis for increased production for the Foundation Seed Programme.

The crop from 30 acres of Katahdin potatoes free from ring rot [*Corynebacterium sepedonicum*: ibid., 30, p. 26], originating from greenhouse indexed seed stocks, was distributed to farmers in 1949 under the above scheme. The exposure of contaminated cut seed to sunlight and air circulation reduced the amount of ring rot infection from 100 to 15 per cent. Sunlight may also be useful in sterilizing machinery and equipment. The organism has been found to remain viable for long periods in dark storage bins or other protected places. Five seedling varieties derived from crosses with *Solanum demissum* possessed resistance to ring rot and late blight [*Phytophthora infestans*]. Of approximately 291 commercially desirable selected

seedlings from resistant parents some were highly resistant to ring rot [ibid., 30, p. 386].

R. Bonde and J. A. Robinson report that because blight did not become prevalent until after 10th September, when most farmers had ceased spraying, considerable losses from tuber rot occurred in some fields, especially those dusted from a helicopter. In a comparative fungicide test tribasic copper sulphate [ibid., 30, p. 451] combined with zinc, and copper zinc chromate both produced the highest yield rate of 220 barrels per acre, followed by parzate (218), and all completely controlled blight. Bordeaux and parzate plus zinc sulphate gave the best control of early blight [*Alternaria solani*], followed by copper zinc chromate, tribasic copper sulphate, and dithane D14 plus zinc sulphate, in decreasing order of effectiveness. Puratized 111–5, a compound containing mercury and copper, gave good yields and controlled both blights. Copper nitrodithioacetate (3 lb.), combined with 1 pt. 25 per cent. DDT and 3 per cent. parathion emulsion [cf. ibid., 30, p. 348] in 100 gals. spray mixture, improved yields considerably and gave excellent control of blight diseases and insects. Parathion (1 lb.) in 100 gals. Bordeaux gave similar results and was significantly superior to Bordeaux and tribasic copper sulphate, both in combination with DDT. Tribasic copper sulphate talc dusts (7 per cent. copper) plus 1 per cent. parathion resulted in higher yields, one-third the number of aphids, and a reduction in early blight as compared with the same dust containing 5 per cent. DDT. A newly developed cuprous oxide powder containing 90 per cent. metallic copper blended with talc and DDT was equal to the standard cuprocide and tribasic copper sulphate talc dusts in controlling early and late blights and is said to be cheaper than other similar fungicides on the market. In 1949 the impregnated dusts containing 1·5 per cent. DDT in oil gave higher yields than dithane Z-78, cuprocide, or tribasic copper sulphate dusts, apparently owing to a reduction in early blight infection. All the fungicides in the test controlled late blight. The best control of early blight was obtained when the dusts were applied in the morning when the foliage was moist.

According to D. Folsom and H. Q. Roach [ibid., 30, p. 26] the 1949 crop showed some increase in mahogany browning in transit between Aroostook County and New York City, while occasionally from a third to a half (by weight) of the clear-fleshed tubers developed net necrosis [? virus: loc. cit.]. Usually some increase occurred in the percentage of tubers showing ring rot during transit; late blight always appeared to decrease, but soft rot [*E. carotovora*] significantly increased in the latter and in associated blight-free tubers.

In experiments by C. E. Cunningham and M. Goven rotobeating potato haulms again resulted in practically no vascular discoloration in the tubers, but it was once more found necessary to apply a vine-killer to destroy new growth on the haulm stubs. G. L. Terman and B. E. Plummer report that following soil applications of sodium arsenite haulm-killer to plots at Presque Isle in the spring of 1949, at 50, 200, and 400 lb. arsenic trioxide per acre, the 400-lb. rate decreased the potato yield by more than 100 bushels compared with the untreated plots, retarded emergence, and reduced the stand of both potatoes and oats. The 50 and 200 lb. rates resulted in smaller decreases in yield.

Bonde (R.) & Merriam (D.). **Potato spindle tuber control.**—*Bull. Me agric. Exp. Sta.* 487, 15 pp., 5 figs., 1951.

In recent years potato spindle tuber virus [*R.A.M.*, 27, pp. 86, 176; 28, p. 537 and preceding abstract] has been troublesome in Maine in some of the newer commercial varieties. Varietal differences in symptoms and susceptibility have necessitated a re-study of the problem in these varieties. Experiments have shown that although the virus may be transmitted by aphids [ibid., 23, p. 74], grasshoppers [*Melanoplus* spp.: ibid., 10, p. 617], flea-beetles [*Epitrix* spp.: loc. cit.], and

Colorado beetles [*Leptinotarsa decemlineata*: ibid., 9, p. 401], they are sometimes not very effective as vectors. The disease may, however, be spread readily by contamination of the seed stock by mechanical means during storing, handling, and planting, by the seed-cutting knife, and through the contamination of sprouts and eyes of seed potatoes with sap from diseased tubers. Spread may be reduced by drying and covering cut seed before planting. Since the disease is often difficult to detect in the field it is not readily rogued. Planting seed tubers by the tuber unit method will aid in detecting the disease. Roguing should be thorough and should commence as early in the season as possible, healthy tuber lines for breeding being harvested early.

Stelzner (G.). **Virusresistenz der Wildkartoffeln.** [Virus resistance of wild Potatoes.]—*Z. PflZücht.*, 29, 2, pp. 135–158, 4 figs., 1950.

In experiments carried out from 1939 to 1944 at the Max Planck Institute, Voldagsen, Germany, various wild *Solanum* species of the *Commersoniana*, *Tuberosa*, and *Acaulia* groups were tested for resistance to viruses X, Y, X+Y, A, and leaf roll [*R.A.M.*, 30, p. 240]. The plants were infected by sap inoculation, insect transmission, and grafting. No wild species was tolerant of or resistant to all the viruses, but many were tolerant of single viruses and probably immune from X and Y.

The species of the group *Commersoniana* (chromosome number 24) were susceptible to X and Y, but *S. cordobense* and the Agraciada and Bukasov strains of *S. chacoense* showed no reaction to virus A, Bukasov being also fully tolerant of leaf roll.

The species in the *Tuberosa* group (24 or 48 chromosomes) were tolerant of or resistant to A, while Reddick's strains of *S. antipoviczii* Nos. 580, 560, 558, and 557 developed no symptoms when infected with virus Y. Species with 72 chromosomes [ibid., 27, p. 380] were very susceptible, all species of this group being susceptible to virus X and leaf roll.

All *S. acaule* strains (Blossfeld, San José, La Pena blanca, and Bukasov) were completely tolerant of virus X, none developing symptoms. The tolerance was inherited. Sap inoculations to chilli demonstrated that the virus was present in most of the plants, though it was absent from 70 per cent. of La Pena blanca and Bukasov.

Panjan (M.) & Lušin (V.). **Ispitivanja diferencijalnih biljaka na A i Y-virus.** [Investigation of test plants for the differentiation of the A and Y viruses.]—*Glasn. hrv. prirodosl.*, Ser. II/B, (*1948–1949*) 2–3, pp. 22–25, 1 fig., 1950. [English summary.]

Of various Solanaceae investigated in Yugoslavia for differentiating the potato viruses A and Y [*R.A.M.*, 18, p. 472], *Solanum ochroleucum* and *Datura metel* proved to be promising indicators. Both species reacted with mild symptoms (vein-clearing) to inoculation with virus A and severely to virus Y.

Brakke (M. K.), Black (L. M.), & Wyckoff (R. W. G.). **The sedimentation rate of Potato yellow-dwarf virus.**—*Amer. J. Bot.*, 38, 5, pp. 332–342, 2 pl., 2 fig., 4 graphs, 1951.

In studies at Brooklyn Botanic Garden, New York, and the Laboratory of Physical Biology, National Institute of Health, Bethesda, Maryland, preparations made by differential centrifugation of juice from *Nicotiana rustica* infected with potato yellow dwarf virus [*R.A.M.*, 30, p. 484 and next abstract] showed a visible boundary after horizontal centrifugation in a 2 mm. capillary tube at 3,400 r.p.m., though similar preparations from healthy plants showed no such boundary. Samples from below the boundary were infective, and electron micrographs showed the virus bodies, which varied very much in shape. The diameter of the virus

(assuming it has a spherical shape) was estimated from the sedimentation constant to be 110 mμ, a measurement which fits with other data.

Hougas (R. W.). **Factors affecting sap transmission of the Potato yellow-dwarf virus.**—*Phytopathology*, 41, 6, pp. 483–493, 3 figs., 1951.

At the Wisconsin Agricultural Experiment Station *Nicotiana rustica* was used as an assay plant to determine the influence of certain factors on the sap transmission of potato yellow dwarf virus [*R.A.M.*, 18, p. 270 and preceding abstract]. The incidence of infection was increased two to four times by 18 to 24 hours' pre-inoculation exposure to darkness, while post-inoculation temperatures of 80° F. and upwards promoted the development of both primary and systemic symptoms. The longevity of the virus in dilutions of 1 in 100, 1 in 1,500, and 1 in 2,500 was extended by the addition of cysteine hydrochloride in concentrations of 0·01 to 0·04 M.

Sebago potato plants responded similarly to the factors favouring infection of *N. rustica*. Plants placed in the dark for 16 hours or more before inoculation acquired susceptibility to the sap-transmitted yellow dwarf virus, while no infection occurred on those given a preliminary exposure to sunlight for seven hours and longer. The inclusion of cysteine hydrochloride in the inoculum increased the number of primary lesions. The leaves of the middle third of potato plants 2 to 2½ ft. high were two to 12 times as susceptible as younger or older foliage. Using the procedures of pre-inoculation exposure to darkness and admixture of cysteine hydrochloride with the inoculum, sap transmission of yellow dwarf virus, hitherto accomplished only with difficulty, was greatly facilitated, infection being conveyed to 62 out of 64 potato plants, with systemic involvement in 51.

Bazán de Seguro (Consuelo). **Posibilidad de pronosticar la iniciación y progreso del 'hielo' de la Papa (Phytophthora infestans).** [The possibility of forecasting the inception and progress of Potato blight (*Phytophthora infestans*).]—*Bol. Estac. exp. agríc., Lima*, 39, 12 pp., 2 pl., 2 figs., 1 graph, 1 map, 1950. [Mimeoprinted.]

In connexion with an epiphytotic of potato blight (*Phytophthora infestans*) in the Department of Lima, Peru [*R.A.M.*, 25, p. 42] in 1950, the author summarizes from 11 important contributions to the relevant literature the available information on forecasting outbreaks of the disease [ibid., 11, p. 559; 13, p. 260; 14, pp. 391, 715; 29, pp. 115, 428, *et passim*]. Blight was of little importance locally before 1947, when it acquired unwonted virulence, causing heavy losses and necessitating large-scale prophylactic treatment in succeeding years.

During the planting season (from the end of October) a constant drizzle prevails, accompanied by continual mist and very high relative humidity, of late years reaching 98 to 100 per cent. during the greater part of the night [cf. ibid., 30, p. 68]. In 1945, when blight was absent, nocturnal relative humidity was less than 95 per cent. and there were wide fluctuations in the day temperatures from April to October, whereas in the epiphytotic year of 1949 nocturnal relative humidity was 100 per cent. and the limits of diurnal temperature fluctuation were narrow (minimum 10° to 13° C.). In 1950, when the prevailing climatic conditions were intermediate between those of 1945 and 1949, spray warnings were issued to certain growers on the critical dates of 17th June and 15th July, recommending treatments at 13- to 15- and 8- to 10-day intervals, respectively, which were applied with successful results. Mindful of recent outbreaks of blight, the majority of Lima Valley growers have adopted the practice of spraying at four- to five-day intervals, representing an average of 13 applications for the season, but this needless expenditure could be saved and the harvest guaranteed by the extension of the warning service to the entire region.

Post (J. J.) & Richel (C.). **De mogelijkheden tot reorganisatie van de waarschuwingsdienst voor Aardappelziekte.** [The possibilities of reorganization of the Potato blight warning service.]—*Landbouwk. Tijdschr.*, 63, 2, pp. 77–95, 8 graphs, 2 maps, 1951. [English summary.]

A disadvantage of van Everdingen's otherwise satisfactory system of forecasting epiphytotics of potato blight (*Phytophthora infestans*) [see preceding abstract] in Holland [*R.A.M.*, 14, p. 715] is that the warnings issued from the field stations are frequently of only local (as opposed to regional) applicability. In 1948 and 1949, therefore, the possibilities of adapting Beaumont's method [ibid., 27, p. 88] to Dutch conditions were investigated. It was clear from the reports of the synoptic stations, which are available hourly at the Meteorological Institute, that outbreaks tend to occur after two consecutive days with a mean relative humidity of 82 per cent. and upwards, accompanied by a minimum temperature of or over 10° C. at 40 cm. and 2·2 m. above soil-level on at least one of these days. A drop in the relative humidity to 79 per cent. on one of the two critical days did not preclude the establishment of infection. Using these criteria, all the necessary data are now obtainable from the weather maps and the synoptic stations, and they are, moreover, of regional instead of merely local validity.

Castronovo (A.). **Fuentes de resistencia a 'Phytophthora infestans'.** [Sources of resistance to *Phytophthora infestans*].—*Rev. Invest. agríc., B. Aires*, 4, 3, pp. 245–275, 1 pl., 1950.

Reference has already been made to the results of the author's quest for sources of resistance to potato blight (*Phytophthora infestans*) in Argentina [*R.A.M.*, 29, p. 352], of which this is an amplified, fully tabulated account. Additions to the resistant selections already reported include D.C.R.-9 and D.H.B.-6.

Nattrass (R. M.) & Ryan (Moira). **New hosts of Phytophthora infestans in Kenya.** —*Nature, Lond.*, 168, 4263, pp. 85–86, 1951.

During 1950 the foliage of certain woody perennial species of *Solanum*, which abound as weeds and forest under-shrubs in the Kenya Highlands, became infected by *Phytophthora infestans* [*R.A.M.*, 26, p. 465]. No blight had been seen on them before. The disease was first detected on *S. indicum*; later *S. incanum*, one of the commonest species, was generally attacked in the vicinity of the original outbreak on *S. indicum*. A few weeks later the fungus was collected on leaves of a *Solanum* (near to *S. panduraeforme*) in forest clearings at the foot of Mt. Kenya, some hundred miles to the north-east. Sporangia from *S. incanum* readily infected an unknown variety of potato, from which plants the fungus was transferred to *S. indicum*. Tests by Dr. Black indicated strain *C* as the biotype. It would appear that approximately ten years elapsed before the resistance of these three indigenous *S.* species to the fungus was broken down.

Zadina (J.). **Zkoušky Bramborů na vzdornosť proti plísni Bramborové (Phytophthora infestans).** [Tests on resistance to Potato blight (*Phytophthora infestans*).] —*Ochr. Rost.*, 23, 4, pp. 316–339, 5 figs., 1950. [Russian and English summaries.]

In extensive greenhouse and laboratory tests in Czechoslovakia over a period of years the foliage and tubers of a large number of potato varieties were tested against blight (*Phytophthora infestans*) [*R.A.M.*, 26, p. 508] by artificial inoculation with isolates from 15 localities. The tubers of the following were resistant: Aquila, Erika, Falke, Monika, Roswitha, Robusta [ibid., 29, pp. 579, 580; 30, p. 240], Sandnudel, Fytoftoraustojčivij [*Phytophthora* resistant], Kaměraz I, and Kaměraz II, the two last-named being resistant also to leaf infection.

Macek (J.). **Vliv teploty na zdravotní stav uskladněných Bramborů a na jejich výnos.** [The influence of temperature on the health and yield of stored Potatoes.]—*Ochr. Rost.*, 23, 4, pp. 304–316, 3 graphs, 1950. [Russian and English summaries.]

The results of experiments conducted during 1943–4 in Czechoslovakia, in which potato tubers of various varieties were taken from store at 4° to 8° C. at various times during the season and kept at 20°, 25°, and 30° C. for one, five, and ten days, after which they were again returned to the cold store, demonstrated the harmful effect of high temperatures even for one day, especially in early spring. The vitality of the tubers when planted was considerably less than those stored at low temperatures throughout and the plants were more susceptible to stem diseases caused by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 30, p. 120] and *Bacillus phytophthorus* [*Erwinia phytophthora*: ibid., 29, p. 640]. There was also a high percentage of small tubers, thus lowering the yield. Storage at high temperatures did not influence the incidence of [unspecified] virus diseases, wart disease (*Synchytrium endobioticum*) [ibid., 30, p. 119], or scab (*Actinomyces scabies*) [ibid., 30, p. 71], or resistance to them.

Batista (A. C.) & Gayão (Tereza de J.). **Doenças do Arroz, em Pernambuco.** [Rice diseases in Pernambuco.]—*Bol. Agric., Pernambuco*, 17, 3–4, pp. 181–185, 5 figs., 1950.

Rice panicles in Pernambuco, Brazil, sustain combined infection by *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: C.M.I. map No. 92], *Septoria oryzae* [*R.A.M.*, 5, p. 723; 29, p. 530], *Phoma glumarum* [ibid., 17, p. 769], and *Teichosporella oryzae* n.sp., of which the three last-named are directly or indirectly responsible for grain splitting, which results in the discharge of starch during storage. In some cases, especially where *P. glumarum* predominates, the panicles assume a whitish hue induced by the disintegration of the grains and starch liberation. *O. miyabeanus* occurs on the glumes either independently or in association with the fructifications of *S. oryzae* and *P. glumarum*.

T. oryzae is characterized by superficial, gregarious, globose or irregular, brown, carbonaceous to membranous perithecia, 121·6 to 136·8 by 114 to 129·2 μ, with a papillate ostiole; and sessile, clavate, sparsely paraphysate asci, 57 to 68·4 by 22·8 to 34·2 μ, rounded at the apex, each containing eight muriform, hyaline, polystichous, elongate-ellipsoid, obtuse ascospores, 22·8 to 26·6 by 8·3 to 10·6 μ with four transverse and one to two longitudinal septa.

Piricularia oryzae [C.M.I. map No. 51; *R.A.M.*, 26, p. 335] was observed once in small plantings in the Sao Francisco district. Prophylactic measures against rice diseases should include seed treatment with ethyl mercury phosphate; selection and cultivation of resistant varieties; use of seed from disease-free localities; sowing in soil with a pH of 6·5; prompt destruction of plant refuse; and crop rotation if the foregoing precautions prove inadequate.

Douglas (W. A.) & Tullis (E. C.). **Insects and fungi as causes of pecky Rice.**—*Tech. Bull. U.S. Dep. Agric.* 1015, 20 pp., 3 figs., 1950.

Investigations were begun in 1934 by the Bureau of Entomology and Plant Quarantine, in co-operation with the Bureau of Plant Industry, in Louisiana and Texas to determine the relative importance of insects and fungi in the production of a spotted condition of rice kernels known as 'pecky rice', which causes considerable losses to growers and millers. Plants were grown in experimental cages using the treatment customary in commercial fields. Only the brown to black or occasionally yellow or red discoloration of all or part of the kernel was due to fungi, small, black sclerotia occurring under the seed coat in some cases. Fungi were

isolated from 59 per cent. of the discoloured kernels, also from 46 per cent. of the kernels with insect injury, and less frequently from kernels with black linear discolorations. The species most frequently associated with pecky rice from all sources were *Curvularia lunata* [*R.A.M.*, 29, p. 329], *Fusarium* spp., *Phoma* spp., *Trichoconis caudata* [ibid., 26, p. 167], and *Helminthosporium oryzae* [*Ophiobolus miyabeanus*]. Artificial inoculation with *O. miyabeanus* and *C. lunata* in 1938 caused a marked increase in the percentage of kernels attacked by these fungi.

Isolations from spotted leaves, stink bugs (*Solubea pugnax*) infesting leaves, and kernels these insects had been feeding on showed that it is possible for them to carry spores of *Nigrospora oryzae*, *C. lunata*, and *Phoma* spp., but not of *O. miyabeanus* or *Cercospora oryzae*.

Hashioka (Y.). **The microclimate of the Paddy field in connection with prevalence of the Rice blast disease.**—*J. agric. Meteorol.* (*Japan*), 6, pp. 25–29, 3 graphs, 1950. [Japanese, with English summary.]

Under the prevailing microclimatic conditions at Taichung, Formosa, dissemination of the conidia of rice blast [*Piricularia oryzae*: *R.A.M.*, 30, p. 190] occurs exclusively during the night, especially between midnight and daybreak, when the relative humidity exceeds 90 per cent. Dew appears on the leaves immediately after sunset, and in the absence of wind the dew drops remain long enough on the leaves for the pathogen to enter the host. Blast did not develop in densely sown plots without a fertilizer, whereas in manured plots infection was more severe where dense sowing was practised. In the early stage of tillering the incidence of infection appears to run parallel with density of planting, but subsequently the plants in the thinly sown plots sustain heavier damage. This belated acquisition of resistance by plants in the densely sown plots may be due to the gradual decrease in the nitrogen content of the leaves and soil, resulting in less dense growth with consequent lowering of the humidity to a greater extent than in the sparsely sown plots, where the surplus nitrogen remaining in the soil promotes luxuriant growth.

Hashioka (Y.). **Rice stripe (Oryza virus 2).**—Reprinted from *Fmrs' Bull. Saitama agric. Exp. Sta.*, 6 pp., 10 figs., 1951. [Mimeoprinted. Japanese, with English summary.]

Rice stripe virus [*R.A.M.*, 19, p. 429] is stated to be confined to Japan, where it is specially prevalent in the Kanto district. The disease may be effectively combated by dusting with BHC [benzene hexachloride] in the later seed-bed and early field stages to destroy the leafhopper vector, *Delphacodes striatella*.

Reitsma (J.) & Schure (Miss P. S. J.). **'Kresek', a bacterial disease of Rice.**—*Contr. gen. agric. Res. Sta., Bogor*, 117, 17 pp., 9 figs., 1950. [Indonesian summary.]

The symptomatology of a rice disease first observed on the beardless Mas variety near Bogor, Java, in the 1948–9 west monsoon is described, together with preliminary observations on the causal organism, a species of *Xanthomonas*. The first sign of infection, a green, watersoaked spot, soon turning greyish-green, appears on 30-day-old plants a week to a fortnight after transplanting just below the cut surface near the leaf tip, which is often excised immediately beforehand. At the same time the leaf folds over lengthwise just below the cut surface. Then the entire leaf begins to wither and folds along the midrib, which is often of a yellowish colour. The withered leaves, which may be seen floating on the water of the rice field, soon assume a straw-yellow to light-brown tinge. At this stage the disease is known as 'kresek'. Infection subsequently spreads to the leaf sheath, where a large, irregular, green watersoaked lesion is formed, turning yellow and later light

brown, and with the further progress of the disease the young leaves become infected by contact. The bacteria usually spread through the host along the xylem vessels. During the passage of infection from the culm to the younger leaves some of the latter fold over, while others (the youngest) curl. A white stripe may develop along the greater part of the midrib. The symptoms of this final phase, known as 'hama lodoh', resemble those of borer attack, but in the latter case the youngest leaves are infested first, whereas initial invasion by the *Xanthomonas* generally occurs through the older ones. Some plants are killed in the early stages of growth by the 'kresek' phase, but others survive by means of the tiller buds remaining after the death of the main stem and a few shoots. The other beardless varieties, Tjina and Bengawen, also sustain serious damage from the *Xanthomonas*, which is quickly followed by secondary invaders. The bearded Solo and Djalen, on the other hand, are relatively resistant.

The results of inoculation experiments, involving the immersion of plants with cut and intact leaf tips in bacterial suspensions from pure cultures, demonstrated the greater susceptibility of the former. No evidence of transmission of the disease through the seed was forthcoming. The following control measures are recommended for susceptible varieties on the local laterite soils: the seedlings should not be transplanted to the field before they are 40 days old, the leaves should be left intact, and at least three seedlings should be planted together.

Altson (R. A.). **Report for the period January 1946 to December 1948. Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya, 1945–1948*, pp. 96–190, 1950. [Received May, 1951.]

In this report [cf. *R.A.M.*, 30, p. 387] it is stated that an experiment has been laid out at Sungei Buloh to determine the influence of the age and vitality of *Hevea* rubber trees on the activities of the three major root parasites (*Ganoderma pseudoferreum*, *Fomes lignosus*, and *F. noxius*) [loc. cit.], using two groups of 20-year-old and two of six-year-old trees. In one group of each the roots are severed and in the other they are intact. Infection is assured by applying inocula in the shape of naturally infected roots. At the end of two months, laboratory examination of lateral roots showed that *F. lignosus* greatly exceeded the other two pathogens in virulence and vigour, having infected all four of the inoculated intact roots on the 20-year-old trees, even penetrating the cortex and wood of two of them. Four methods of stump poisoning were compared: A, 15 oz. sodium arsenite as a 50 per cent. solution was introduced through 1 in. auger holes bored from the outside of a high-cut stump inwards and downwards over the lateral roots; B, introduced through 1 in. auger holes bored from the cut surface of a low-cut stump downwards and radially outwards towards the laterals; C, mixed with a tapioca flour paste and painted on to the cut surface of the stump; D, poured directly into the cracks on the cut surface. Chemical analyses of samples at intervals of three days showed that although method A was the most effective means of introducing the poison into the laterals, B gave a more uniform distribution. In D the effects of the treatment appeared to be confined to the taproots while the condition of the roots in C was indistinguishable from that of untreated ones. The growth of *F. noxius* was completely inhibited on potato dextrose agar containing 0·0625 per cent. sodium arsenite.

Mouldy rot (*Ceratostomella* [*Ceratocystis*: see above, p. 498] *fimbriata*) became prominent at the end of 1946 in several districts, favoured by the wet weather and by abnormally dense undergrowth. It was severe in some areas throughout 1947. In 1948 an unexpected outbreak occurred on many smallholdings in North Kedah and Perlis, probably introduced by labourers from Central Kedah. The use of a sprayer for applying fungicides to the tapping panel resulted in a significant saving of labour costs compared with painting and in a marked increase in the

acreage covered in a working day. An experimental sprayer suitable for this purpose has been built and has given satisfactory results. In field trials the synthetic fungicide fixanol V.R. (tetradecyl pyridinium bromide) at 0·25 per cent. eradicated mouldy rot completely after eight applications.

A severe outbreak of black stripe (*Phytophthora palmivora*) [ibid., 18, p. 341] occurred in 1947 on an estate in the Sungei Siput district. B.D.5, Avros 49, and Pilmoor A.44 clones were the most severely affected. In 1948 a serious outbreak occurred in Kedah. Two widely separated areas planted with nine-year-old trees of clones Pil.B.84 and Tj.1. developed symptoms within three weeks of being brought into tapping for the first time. Other cases occurred in the Sungei Siput district of Perak and in the Rompin district of Negri Sembilan.

Outbreaks of secondary leaf fall, previously attributed solely to *Oidium heveae*, may also be caused by *Gloeosporium albo-rubrum* [ibid., 29, pp. 57, 229]. They occurred everywhere except in Trengganu and Kelantan during 1947 and 1948 and were rather severe in Ulu Selangor in 1947. Less than 50 per cent. of the cases examined in 1947 and 24 per cent. in 1948 could be attributed to *O. heveae* alone, although this parasite was present in 89 per cent. of the cases examined in 1948.

Bird's eye spot (*Helminthosporium heveae*) [ibid., 16, p. 61] became prominent in seedling nurseries all over the country towards the end of 1947, some particularly severe outbreaks in Selangor and Johore leading to much defoliation. This disease is now the most serious of all the leaf diseases affecting young rubber trees in Malaya. Every plant in a ten-acre nursery of clonal seedlings in Selangor was heavily attacked in 1948 and severely defoliated. There are indications that shaded seedlings are less susceptible than those growing in the open. A leaf disease bearing a superficial resemblance to bird's eye spot and regarded provisionally as due to a *Spondylocladium* sp. was encountered in a seedling nursery in Selangor. A *Colletotrichum* sp. distinct from *C. heveae* [? *Glomerella cingulata*] has been observed occasionally on the leaves of seedlings severely attacked by *H. heveae*. There were a few cases in 1948 of defoliation of young bud-grafts and die-back of seedlings and bud-grafts associated with infection by *Gloeosporium albo-rubrum*. Anthracnose (*Glomerella cingulata*) caused some concern in a field of three-week-old clonal seedlings in Negri Sembilan.

Details are given of the measures taken to guard against the introduction of South American leaf blight (*Dothidella ulei*) [ibid., 27, p. 381] including investigations of methods of eradication and of procedures to ensure the freedom from disease of imported planting material.

Pink disease (*Corticium salmonicolor*) was active in stands of young rubber in several districts during the wet weather in 1946 and in early 1947. In some cases where regular cutting out had not been performed, infection had spread to the lower branches and even to the main stem. *F. noxius* caused extensive die-back of ten-year-old trees of clone Tj.1 in the Klang district of Selangor having gained entry through wounds caused by wind damage.

Young (H. E.). **An alternate host of Hevea mildew.**—*Quart. Circ. Ceylon Rubb. Res. Scheme*, 26 (*1949*), 1–4, pp. 13–15, 1950.

The occurrence of *Oidium heveae* [see next abstract] on *Euphorbia pilulifera* in Ceylon has already been noticed from another source [*R.A.M.*, 30, p. 342]. Inoculations on young *Hevea brasiliensis* proved the pathogenicity of the *Euphorbia* fungus to rubber.

Young (H. E.). **Natural resistance to leaf mildew of Hevea brasiliensis by clone LCB. 870.**—*Quart. Circ. Ceylon Rubb. Res. Scheme*, 26 (*1949*), 1–4, pp. 6–12, 1 pl., 1 graph, 1950.

In breeding work in Ceylon against rubber mildew (*Oidium heveae*) [*R.A.M.*, 30,

p. 191 and preceding abstracts] the resistant clone LCB. 870 grew vigorously and reached the required girth standard. Some mildew occurs on the very young leaves and there is slight leaf fall of the young bronze leaflets, but not enough to cause noticeable thinning. In the more mature stages the young leaves are not attacked; in the intermediate stages there is some leaf-spotting but no defoliation or distortion. Investigations into the reasons for this demonstrated that initial cuticle appearance occurred on the same day as with the other clones but development was completed by the tenth day when the leaf was at the maximum length of 17 cm., whereas in the others maximum cuticle thickness occurred on the 18th to 22nd day. In LCB. 870 leaflet growth took place at a uniform rate and maturity was reached much sooner than in the others and before maximum leaflet size was attained. Thus, there is only a short period during which damage can be caused, that is during the first day or two after bud burst, but intensity of infection must be great. Attempts to produce high-yielding resistant clones by cross-pollinating LCB. 870 with high-yielding varieties are in progress.

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Bacterial leaf-spot of Castor.**—*Curr. Sci.*, 20, 1, p. 20, 1951.

The agent of a severe bacterial leaf spot of *Ricinus communis* in Bombay, similar to the disease of the same host previously reported from Japan [*R.A.M.*, 8, p. 221] and Uganda (*E. Afr. Agric. Fmg*, 1, p. 25, 1935), is attributed to *Xanthomonas ricinicola* [cf. *R.A.M.*, 26, p. 81]. The Gram-negative, capsulate, non-spore-forming rods, occurring singly or in chains, are 1·5 by 0·7 μ; on potato dextrose agar the circular, smooth, shining, marguerite-yellow colonies, with lobate margins and peripheral striations, attain a diameter of 1·2 cm. in seven days; gelatin is liquefied, starch hydrolysed, casein digested, milk peptonized, litmus reduced, ammonia and sulphide produced, and nitrates not reduced; acid but no gas is evolved from dextrose, sucrose, and lactose; the optimum temperature for growth is 31° C. and the thermal death point about 51°.

Some of the circular, watersoaked spots, 0·5 to 1 mm., with pale green centres and dark margins, produced mostly near the leaf tips, expand to a diameter of 2 to 3 mm., becoming angular and dark brown to jet-black. Sometimes the lesions coalesce and the areas surrounding them turn light brown and assume a brittle consistency. A bacterial exudate composed of glistening beads or fine scales is formed on both leaf surfaces, the upper becoming raised and the lower depressed. The petioles and veins are also infected.

Abbott (E. V.). **The brown spot leaf disease of Sugarcane in Louisiana.**—*Sug. Bull., N.O.*, 29, 9, pp. 134, 139–142, 1 fig., 1951.

Brown leaf spot (*Cercospora longipes*) of sugar-cane [*R.A.M.*, 16, p. 206] has been present in Louisiana for many years, but not until the release and widespread cultivation of the susceptible variety C.P. 36/105 did it assume commercial importance. Following the abnormally mild winter of 1949–50, which permitted the survival of the pathogen on living plants, infection was as severe by early April, 1950, as it usually is in June, and heavy losses resulted. On 30th September the average severity ratings, based on 10 classes, ranging from 1 = no infection to 10 = heavy infection, in plots of C.P. 36/105 sprayed on 7th April and then at fortnightly intervals from 9th May onwards with parzate, microgel [ibid., 26, p. 220], and untreated were 4·5, 3·3, and 7, respectively, corresponding to averages of 484, 214, and 706 spots per leaf, respectively.

The best means of combating brown leaf spot is by the cultivation of resistant varieties, e.g., Co. 290, C.P. 29/116, C.P. 29/120, C.P. 29/320, C.P. 36/13, C.P. 36/183, C.P. 44/101, and C.P. 44/155. C.P. 44/101 is a prolific yielder and eventually will probably replace C.P. 36/105 to a considerable extent. In several tests 20

minutes' immersion of seed cane from diseased plants in water heated to 125° F., with the addition of 1 pint formalin per 30 gals., prevented the development of *C. longipes* in the subsequent crop. Hot water alone was effective on cane freed from all leaves and debris.

Chu (H. T.). **Re-examination on the seed Cane treatment with granosan solution.**—*Rep. Taiwan Sug. Exp. Sta.*, 5, pp. 63–71, 1950. [Chinese, with English summary.]

Sugar-cane seed pieces of the F108 and F134 varieties immersed for two minutes in a 0·2 per cent. granosan solution [*R.A.M.*, 29, p. 435] at the Formosa Agricultural Experiment Station germinated more rapidly than the untreated controls, but at 0·5 per cent. the chemical impaired germination and at 2 and 5 per cent. prevented it altogether. Most of the other varieties tested also responded favourably to treatment with 0·2 per cent. granosan, except perhaps Co. 285. At this concentration the time required for the elimination of pineapple disease [*Ceratostomella paradoxa*: loc. cit. and next abstract] from the seed pieces could be reduced from two minutes to 10 seconds, and even at 0·1 per cent. satisfactory results were obtained. At 0·2 per cent. the dip could be used 10 or more times in succession for 10 seconds without losing its efficacy, but at 0·1 per cent. it failed after the eighth time even when the immersion period was prolonged to two minutes. In a contaminated area where 'Rejungun' seed pieces were dying in large numbers from pineapple disease, treatment with 0·2 per cent. granosan proved very effective. It is estimated that 2 lb. granosan powder should suffice for the treatment of 1 ha. of seed pieces (25,000 double-bud pieces), using a 0·2 per cent. solution for 10 seconds 10 times consecutively.

Ch'i (C. C.). **A preliminary report on the study of the pineapple disease of Sugar Cane.**—*Sugarcane Res., Taiwan*, 3, pp. 71–102, 1949. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 147, 1951.]

Data on varietal differences in the susceptibility of sugar-cane cuttings to infection by *Ceratostomella paradoxa* in Formosa [see preceding abstract] are given. *Saccharum spontaneum*, *S. barberi*, and F108 [*R.A.M.*, 28, p. 142] were the most resistant types found.

Lo (T. T.) & Ch'i (C. C.). **Disease resistance tests with PT 43–52.**—*Sugarcane Res., Taiwan*, 3, pp. 393–396, 1949. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 147, 1951.]

The new sugar-cane variety PT43–52 is resistant to most of the fungal and virus diseases affecting the crop in Formosa [*R.A.M.*, 29, p. 435; 30, p. 344] except chlorotic streak [see next page], red rot [*Physalospora tucumanensis*: see next abstract], and *Fusarium* top rot [*Gibberella fujikuroi*].

Wong (S-C.) & Tsai (T. K.). **Studies on red rot of Sugarcane in Taiwan. Part I. Symptoms, structure, ascigerous stage, and life history of the pathogen.**—*Rep. Taiwan Sug. Exp. Sta.*, 5, pp. 99–109, 3 figs., 1950. [Chinese with English summary.]

One of the most important diseases of sugar-cane in Formosa is red rot (*Physalospora tucumanensis*) [C.M.I. map No. 186 and preceding abstract]. Since its discovery on the island prior to 1910, the fungus has been an annual source of industrial losses, besides contributing from time to time to the decline of several varieties. The symptomatology of the disease and the morphology and life-history of the causal organism are described. Perithecia develop in profusion on dry leaves in the autumn, giving rise to ascospores which serve as sources of infective material for

primary attacks on the foliage. In the field the upper side of the midrib often harbours myriads of spores blown on to it by the wind or splashed by rain drops, and in this way the disease spreads from one plant to another throughout the rainy season. Before the onset of this period the dry and the diseased leaves from living plants should be collected and burnt.

STEIB (R. J.) & CHILTON (S. J. P.). **Infection of Sugar-Cane stalks by the red-rot fungus, Physalospora tucumanensis Speg.**—*Phytopathology*, 41, 6, pp. 522–528, 1951.

The experimental demonstration in India that *Physalospora tucumanensis*, the agent of red rot, penetrates the nodal tissues of the stalks of susceptible sugar-cane varieties [*R.A.M.*, 21, p. 347] aroused the suspicion that in Louisiana the fungus might be present in a latent form in apparently healthy stalks and develop further therein after planting. An expanded, tabulated account is given of experiments resulting in a confirmation of the validity of this hypothesis, a preliminary notice of which has already appeared [ibid., 28, p. 359].

WANG (C-K.). **Preliminary studies on the brown stripe disease of Sugar Cane caused by Cochliobolus stenospilus (Drechsl.) Mat. et Yam. in Taiwan.**—*Rep. Taiwan Sug. Exp. Sta.*, 5, pp. 110–130, 2 graphs, 1950. [Chinese, with English summary.]

The optimum temperatures for mycelial growth and conidial germination of *Cochliobolus stenospilus*, the agent of brown stripe disease of sugar-cane, which is prevalent in Formosa [*R.A.M.*, 28, p. 142], were found to be 26° to 32° and 23° to 27° C., respectively. The mycelium succumbed to 20 minutes' immersion in water heated to 52° and the conidia to the same period of dry heat at 97° or 40 minutes in water at 48° to 52°. The optimum pH range for mycelial growth was from 4·6 to 6·4. Potato sucrose (5 per cent.) agar was the best of various natural media tested for the growth of the pathogen. Richards's medium with olive oil added as the carbon source gave the best mycelial development, followed in descending order by soluble starch, sucrose, mannitol, dextrin, glucose, lactose, xylose, glycerin, and sodium citrate. Asparagine was the most favourable source of nitrogen, followed by sodium nitrate, peptone, ammonium sulphate, and urea in the order given. The optimum sucrose concentration for mycelial growth in 2 per cent. distilled water agar lay between 10 and 15 per cent., with a maximum at 40 per cent. On sugar-cane leaf decoction agar and potato sucrose agar mycelial development was most abundant in the presence of 0·5 per cent. sodium chloride. Conidial germination was totally inhibited by a copper sulphate solution with a concentration of 1 r. copper ions per ml.

Under field conditions the P.O.J. 2973 variety was the most and F. 110 the least susceptible to brown stripe, P.O.J. 2883 being intermediate in its reaction. Entry to the host was through the stomata, the mycelium being confined to the intercellular spaces of the leaf parenchyma tissue. In addition to rice *C. stenospilus* was shown by inoculation experiments to be pathogenic to wheat, oats, barley, and maize. The disease was controlled in the greenhouse by spraying with 4-4-50 Bordeaux mixture, but not in the field.

LO (T. T.). **Chlorotic streak disease of Sugar Cane in Taiwan. II.**—*Sugarcane Res., Taiwan*, 3, pp. 387–392, 1949. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 147, 1951.]

Notes are given on the varietal susceptibility of Formosan sugar-canes to chlorotic streak [? virus: C.M.I. map No. 29 and preceding page]. *Saccharum robustum*, *Miscanthus* sp., and *S. sinense* failed to show typical symptoms of the disease.